ENERGY SECTOR AND BUSINESS DEVELOPMENT IN NIGERIA. A STUDY OF SOUTH EASTERN NIGERIA: 1990 – 2016

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A DISSERTATION SUBMITTED TO THE DEPARTMENT OF BUSINESS ADMINISTRATION, FACULTY OF MANAGEMENT SCIENCES, NNAMDI AZIKIWE UNIVERSITY, AWKA, IN FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY (Ph.D) DEGREE IN BUSINESS ADMINISTRATION

AUGUST, 2018

DECLARATION

I Nwabisi Paul Nnaemeka do hereby declare that the work contained in this research was carried out by me and I am the original researcher. It has not been submitted in part or full for any other degree of any University.

....

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APPROVAL

This Research titled "***Energy Sector and Business Development in Nigeria. A Study of South Eastern Nigeria: 1990 – 2016***" has been assessed and approved by the Departmental Post Graduate Board.

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DEDICATION

This work is dedicated to my wife - Ifeoma, Daughter - Chimdinma and Son - Chimdindu

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I sincerely ascribe all praise and adoration to the Almighty, Most Merciful, and All-Powerful God, in whom dwells the fullness of all wisdom, for giving me grace, mercy, and understanding to complete this programme, making the dream a rhapsody of reality.

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ABSTRACT

This study focused on Energy Sector and Business Development in Nigeria. A Study of South Eastern Nigeria. Various governments in Nigeria, starting from military to civilian administrations have embarked on energy restructure programmes as a means of addressing energy problems in the Country. Thus the objectives are to determine the extent to which energy supply affects the manufacturing sub-sector of the zone, to ascertain the influence of energy generation relative to installed capacity on business growth, to determine the influence of gas supply on industrial production and to examine the extent to which the use of obsolete electricity generation equipment affect business development of south eastern zone with particular reference to SMEs. Ordinary Least Square (OLS) technique and questionnaire were used in the research work. Data were sourced from various publications of Central Bank of Nigeria, National Bureau of Statistics, National MSME Survey report 2013 of SMEDAN, Federal Ministry of Power, Nigerian Electricity regulatory commission (NERC), Power Holding Company of Nigeria (PHCN), and some online resources. The analysis revealed that energy sector has significant relationship with the business indicators such as manufacturing sub-sector output, energy generation relative to installed capacity, industrial production, labour, technology, import and export variables among others, used in the research work. The restructuring of the energy sector and its influence on business development have a positive relationship with the business growth, the installed capacity of energy on manufacturing and industrial productive sector of the economy. The increase in supply of energy sector enhances the business operations and business development of the South Eastern Zone. The research revealed that strengthening of the energy sub-sector and its constant gas supply in order to ensure steady and reliable power supply in the industrial sub-sector that would facilitate industrialization, enhances the business and economic activities of SMEs. The research recommends that the Federal Government should provide adequate energy infrastructure for a reliable and efficient supply by granting more licences to qualified private investors, providing energy efficiency policies in the area of power. In addition to putting in place strict regulation on importation of foreign goods so that local businesses will thrive.

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INTRODUCTION

1.1 Background of the Study

Energy remains the fulcrum on which all the socio-economic and technological development of every nation revolve and as such access to a reliable energy supply is considered vital for the operations of all business development. Unreliable energy supply therefore affects all sectors of business operations. Nigeria is seen as one of the greatest developing nations in Africa with highly endowed natural resources including potential energy resources. However, increasing access to energy in Nigeria has proved to be a continuous challenge (Odularu and Okonkwo, 2009). Thus to meet the growing needs of energy, Nigeria must address its persistent energy crisis, which according to Iwayemi (2008), has weakened the industrialization process, and significantly undermined the effort to achieve sustained business and economic growth, competitiveness of domestic industries within regional and global markets as well as employment generation.

The Energy sector includes the oil and gas as well as the power sub-sectors of Nigerian economy. It embraces other unconventional sources of energy such as nuclear, solar, wind and bio-mass among others. It is one of the most important sectors in Nigeria, in view of its multiplier effect across all sectors of the economy. Its contribution to government revenues and its potentials to spur significant business development are enormous. Thus the energy sub-sector is associated with business development in relation to manufacturing and commerce, infrastructure, skill acquisition, Knowledge Based Economy – ICT, Technology Based investment, Agricultural Businesses, Solid Minerals and a host of others. Energy is one of the essential sub-sectors that play the most vital role in the overall development of nations. Thus energy consumption has become one of the indices for measuring the standard of living of a country.

The mission of the sector is to provide the nation with adequate and reliable energy supply of about 7,000 Mega Watts. The capacity utilization currently ranges between 3,500MW and 4,500 MW (NIIMP, NPC 2015), but t in June 2013 it was as low as 2,200 MW. 70 per cent of Nigeria's current installed capacity is gas-fired, with the remaining 30 per cent coming from Hydro. The nation's total exploitable large-scale hydropower potential is estimated to have sufficient gas reserves to generate over 50,000 MW, but currently it has only installed capacity of 5,000MW (NIIMP, NPC 2015).

Nigeria's transmission network is split into two types that are a 330 kV and a 132kV network. For each network, there are two elements of basic transmission infrastructure. These are transmission lines and transmission substations. While distributing infrastructure is made up of distribution lines and substations of varying capacities. The energy sub-sector drives all productive activities in the economy including manufacturing, commerce, agriculture and all industrial services, etc.

Recently the energy sector has been associated with increased participation of private sector involvement. Fifty five licences have been issued to private entities since the year 2,000. Out of this, about twenty small private driven energy generation plants are operational, while nine are under construction. With the privatization of Power Holding Company of Nigeria (PHCN) and National Integrated Power Projects (NIPP) assets, there are few generation companies operating in Nigeria. One of the challenges faced in generation is insufficient investment over the past decade. According to the National Integrated Infrastructure Master Plan (2015), the National Integrated Power Project (NIPP) plants are insufficient compared to the overall need. Generation and Distribution in the energy sector have been privatised. This development has started to yield much needed investment in generation assets (NIIMP, NPC, 2015).

The economic progress and business development in emerging economies have been underpinned to the crucial enabling role played by the energy sector. The energy sector significantly influences the vibrancy and sustainability of the entire economy ranging from job creation to resource efficiency. Energy sector's impact on the business development is great and has an input into nearly every good and service in the economy (Voser, 2011). Put simply, Energy Sub-Sector influences the functionality and performance of business Sub-Sector. Development is understood to include other important and related attributes such as, more equality of opportunity, political freedom and civil liberties. The overall goal of development is to increase the economic, political, and civil rights of all people across gender, ethnic groups, religions, races, regions, and countries (World Bank, 1991). It is widely accepted that there is a strong correlation between business development and the availability of electricity.

Inadequate and poor access to electricity in Nigeria has been a major impediment to Nigeria's business development and economic growth. Small and Medium Enterprises have always been adjudged as the engines of economic growth but their performance is grossly dismal due to inadequate energy supply. Researchers have identified the increase in energy use as a vital component of emerging economies. Morimoto and Hope (2001) opined that a crucial factor that supports business development and economic growth in developing countries is the presence of adequate and regular energy supply. In order to ensure an appropriate recovery of the socio-economic process within the framework of effective economic system, business development, enhancing structures, patterns and evolution of production, allocation and efficient utilization of resources should be of top most priority. A nation that hopes to experience economic growth and development should be ready to ensure adequate and regular energy supply. Is Nigeria ready for this developmental take-off?

In consideration of Nigeria's Aspiration and Targets for the Energy sector, the priorities identified are to increase generation from the current position to 20 GW by 2018 and to 350 GW by 2043 with a focus on gas as the immediate priority and adding alternative sources after 2023. This will strengthen the transmission capacity with immediate focus on increased distribution capacity, with priority placed on making electricity supply available for industrial users and reducing distribution losses. The energy sector goals under **oil and gas**, the priorities are to provide gas distribution infrastructure, increase refining capacity to fully meet national demand.

In addition to this, **Oil and Gas sub-sector** is to advance ‘gas to power’ in order to meet the rapidly growing energy demand of the Country. The target is to increase oil production to 4 mbpd by 2043, with the target of becoming premium motor spirit (PMS) self-sufficient by 2030. Similarly, Nigeria plans to increase its gas production capacity from 7,580 to 11,000mcfpd by 2018, 15,000mcfpd by 2043. The manufacturing capacities of the oil-based industries are set to grow accordingly (Energy TWG, 2015).

The energy sector expectation and priorities is for the completion of privatisation of power generation and distribution assets; to create a clear path for development of the Transmission Company of Nigeria (TCN), including a mandate to lead future industry planning and allow for private sector investment; to implement the Transmission Reinforcement plan to address transmission constraints and improve grid capability and, to complete implementation of the gas master plan. Energy supplies, therefore, are important and critical to the performance of manufacturing and industrial sectors of the economy. These would be anchored on the premise of having a credible regulatory framework and creating market-based approaches (Hammond, 2012).

Electricity generation in Nigeria began in 1896. The Nigerian Electricity Supply Company (NESCO) commenced operations as an electric utility Company in Nigeria in 1929 with the construction of a hydro electric power station at Kurra near Jos. The Electricity Corporation of Nigeria (ECN) was established in 1951, while the first 132KV line was constructed in 1962, linking Ijora Power Station to Ibadan Power Station. The Niger Dams Authority (NDA) was established in 1962 with a mandate to develop the hydropower potentials of the country. However, ECN and NDA were merged in 1972 to form the National Electric Power Authority (NEPA). In 1998, NEPA ceased to have an exclusive monopoly over electricity generation, transmission, distribution and sales.

By 1999-2000 an act was enacted establishing PHCN, an Initial Holding Company (IHC), as a result of Government effort to revitalize energy sector. This was an intended name for privatization which was meant to transfer assets and the liabilities of NEPA to PHCN. It was officially commissioned in 2005 and was to carry out business of NEPA. In the same vein, the National Integrated Power Projects (NIPP) was inaugurated in 2004 to be able to catalyze and fast track the upgrading of adding more capacity to the current available electricity capacity in the country. This was basically a private initiative which is currently being supervised by the Niger Delta Power Holding Company (NDPHC).

The PHCN, as a Company, was unbundled into 18 companies as follows: six generating companies, one transmission company referred to as Transmission Company of Nigeria (TCN), and eleven distribution companies. The generating companies are Egbin Electricity Generating Company (EEGC), Sapele, Ughelli, Afam, Shiroro and Kainji. There are also some new Independent Power Producers under the auspices of the Niger-Delta Power Holding Company (NDPHC). The 11 distribution companies are Abuja Electricity Distribution Company (AEDC), Benin Electricity Distribution Company (BEDC), Eko Electricity Distribution Company (EkEDC), Enugu Electricity Distribution Company (EnEDC), Ibadan Electricity Distribution Company (IbEDC), Ikeja Electricity Distribution Company (IkEDC), Jos Electricity Distribution Company (JEDC), Kaduna Electricity Distribution Company (KdEDC), Kano Electricity Distribution Company (KnEDC), Port-Harcourt Electricity Distribution Company (PHEDC), Yola Electricity Distribution Company (YEDC). Currently, the Federal Government owns 100% of the transmission company, while its hold on the generating companies is 20 per cent (with 80 per cent of equity sold to private investors). In other words; the transmission company of Nigeria (TCN) is 100 per cent owned, generating companies (GENCOs) 20 per cent owned by government and 80 per cent private sector ownership. For DISCOs, 60 per cent owned by private sector, 40 per cent owned by government. The TCN is controlled by the government (nonetheless, the management of TCN is handled by the Canadian company, the Manitoba Hydro Company). On the 30 of September 2013, the Federal Government handed over certificates of ownership to prospective owners.

As at August 2000, the peak generation was 1,500MW. This was grossly below the demand, which was estimated to be about 4,500MW. The transmission lines were radial and were overloaded. The switchgears were obsolete while power transformers have not been maintained for a long time. The distribution sub-sector was in dire need of upgrading as many of its distribution transformers were overloaded while the lines look more like “Cobwebs”. Overall transmission and distribution losses were in the range of 30 – 40 per cent. When these were added to the poor payment record of consumers, collections were less than 50 per cent of power generated (NIIMP, NPC, 2015).

The forecast load for the year 2001 was 4,833.7MW. In order to meet this demand, a generating capacity of about 6,000MW was required. The estimated demand for power in 2005 and 2010 were respectively 9,780MW and 20,000MW. These required generating capacities of 12,700MW and 25,000MW by the respective years. Thus it was necessary to fully rehabilitate the existing power stations (which was expected to provide a maximum of 5,400MW generating capacity) rehabilitate some critical transmission and distribution lines and their associated substations and add new generating, transmission and distribution capacity to the grid, in the immediate and foreseeable future. The power target for the periods of 2014 -2043 is to increase generation capacity from 2013 is 7 GW to 350 GW by the end of 2043, and to ensure sufficient transmission and distribution capacity for delivery of this energy output to both industrial and residential demands. The total length of 330 KV transmission lines from 2013 is 5,552 km to16, 600 km by the end of 2043. T he total transmission transformer capacity from 2013 is 6,000MW to 420,000MW by 2043 (Energy TWG, 2015).

Meanwhile, Nigeria's Vision 20:2020, recognizes infrastructure, and in particular a reliable energy supply, as vital in achieving sustainable growth and development. To meet the Vision 20:2020, Government set a generating target of 40,000MW. The efficient operation of key government parastatals within the national economy affects even the common citizen. The major public utilities are parastatals which its workings can be said to form a major part of the daily living of most people both at work and at home.

The restructure in the energy sector has been a topic of National discourse and there are arguments that it had not contributed to business development in Nigeria. The debate is still on, empirical studies and results had not resolved the conflicting results emanating from the contribution of energy sector to business development of South Eastern Zone of Nigeria and its impact to the overall economy.

1.2 Statement of the Problem

Various governments in Nigeria, starting from military to civilian administrations, have embarked on energy restructure programmes as a means of addressing energy problems in the country, but not much was achieved in spite of huge capital expenditure provided for this in the national budget. The Nigerian Energy Sector has shown very low capacity. Transmission and distribution capacity are currently inadequate and insufficient.

Thus, the Nigerian energy sector is characterized by numerous other problems particularly in the area of low power generation, transmission and distribution. The constraints have created a gap between demand for and supply of electricity, low local content in both technological and human resources input remains a major problem in the sector. In addition to this, the increase in gas production necessary to supply the planned gas power stations and develop other gas-based industries and petrochemicals are yet to be stabilised.

Again insecurity, especially in the South Eastern Region, poses a substantial threat to this sub-sector. Energy sector gaps had hindered the business development of

Nigeria. The prevailing economic crunch in the country has, however, brought about the review of governments' involvement in these parastatals. In essence, the unique historical background of the developing nations has necessitated the governments' extensive intervention in most sectors of the economy, particularly the Energy Sector.

The failure of the energy supply to effectively meet the demand for power consumption in Nigeria has been one of the greatest problems in the area of energy Generation Capacity. This utility has been run as a vertically integrated company charged with the responsibility for the generation, transmission, distribution and sale of electricity to customers. The rapid growth rate makes it difficult for the installed capacity to cope with the requirement of both residential and industrial consumers. Energy supply outages in the manufacturing and industrial sectors have provided a very worrisome dimension to the crisis.

The inability of the energy sector to effectively meet the demand for energy consumption in the Country and most especially the South Eastern Zone of Nigeria has its genesis from these problems which among others include but are not restricted to poor generation capacity relative to installed capacity, inadequate supply, obsolete Technological power plant, fluctuation in water levels powering the hydro plants, vandalization of existing power infrastructure, Gas supply constraints, inadequate maintenance of equipments coupled with Transmission, Distribution capacity that are constantly inadequate; in wheeling and distributing generated power with high transmission losses equally constitute problems. The inability of Businesses to access the needed energy supplies for business development constitute an impediment to business expansion and survival in Nigeria.

The industrial/manufacturing sectors and residential quarters experience frequent energy outages. This reveals the inability of the energy sector to meet the energy needs of the South Eastern Zone of Nigeria. Hence a restructure programme was introduced in order to ensure regular energy supply and improve business development of the overall economy. The foregoing problems coupled with frequent breakdown of energy equipment (seemingly due to overload) affect industrial output; all these have resulted in the low quantum of electricity available for consumption. The current status of electricity supply in Nigeria especially in South Eastern Zone reflects a situation of supply crisis in which industrial growth, business development and socio-economic activities are kept below the potential of the economy.

1.3 Objectives of the Study

The major objective of this study is to ascertain the influence of energy sector on the business development of South Eastern Zone of Nigeria. The *specific objectives* of this study are:

(i) To determine the extent to which energy supply affects the manufacturing sub-sector of the South Eastern zone of Nigeria.

(ii) To ascertain the influence of energy generation relative to installed capacity on business growth of the South Eastern zone of Nigeria.

(iii) To determine the influence of gas supply on industrial production of the South Eastern zone of Nigeria.

(iv) To examine the extent to which the use of obsolete Electricity generation Equipment affect Business Development of South Eastern Zone of Nigeria with particular reference to Small and Medium Enterprise (SME).

1.4 Research Questions

(i) To what extent has energy supply affect the manufacturing sub-sector of South Eastern zone of Nigeria?

(ii) What is the influence of energy generation relative to installed capacity on business growth of the South Eastern zone of Nigeria?

(iii) What is the influence of the gas supply on industrial production of the South Eastern zone of Nigeria?

(iv) To what extent does obsolete Electricity generation Equipment affect Business Development of South Eastern Zone of Nigeria with particular reference to Small and Medium Enterprise (SME)?

1.5 Research Hypotheses

The hypotheses formulated to guide this study are as stated below in their null form and set to be investigated on 5% level of significant:

Hypothesis One

Ho$_1$: *There is no significant effect of energy supply on the manufacturing sub-sector of South Eastern Zone of Nigeria.*

Hypothesis Two

Ho$_2$: *There is no significant influence of energy generation relative to installed capacity on business growth of the South Eastern zone of Nigeria.*

Hypothesis Three

Ho$_3$: *Gas supply does not significantly inhibit activities of industrial production in the South Eastern zone of Nigeria.*

Hypothesis Four

Ho$_4$: *There is no significant effect of obsolete* Electricity generation Equipment on the Business Development of South Eastern Zone of Nigeria.

1.6 Significance of the Study

This study will bring to the Government, the knowledge of how far and to what extent her effort has gone in addressing major energy sub-sector issues. It will also guide the government where success is recorded to pursue further the restructure strategy and open new frontiers for it. Reliable energy supply is vital to business, industrial and manufacturing sub-sectors of the economy. Accessible energy infrastructure encourages productivity, growth and investments, but when it is poor, unreliable, or inaccessible, business operations would be stultified. Lack of adequate energy supply can lead to a forced halts on manufacturing processes, use of machine tools, or textile production, as well as communications. Unreliable energy access is a deterrent to business expansion, new entrant, economic growth and development.

The outcomes from this research will inform the Government, academia, and will also create great understanding among students on the nature of energy restructure and its associated challenges. Where the restructure has not made any significant progress, the government may fine-tune the existing strategy or introduce new measures completely for optimal performance. The research will also identify further areas of future research, if there is need for that.

1.7 Scope of the Study

This study is focused on the South Eastern Zone comprising five (5) states in Nigeria (Anambra, Abia, Ebonyi, Enugu and Imo States) for the period of twenty seven (27) years (1990 – 2016). Enugu Electricity Distribution Plc (Enugu Disco), located in Nigeria's South East zone, distributes and markets electricity in franchise area that includes Abia, Anambra, Ebonyi, Enugu and Imo States. The franchise area is further subdivided into 10 districts, namely, Aba, Abakaliki, Abakpa, Awka, Ogui, Onitsha, Orlu, Owerri, Nnewi, and Umuahia. The Aba and Onitsha districts are two major domestic commercial industrial centers of Nigeria.

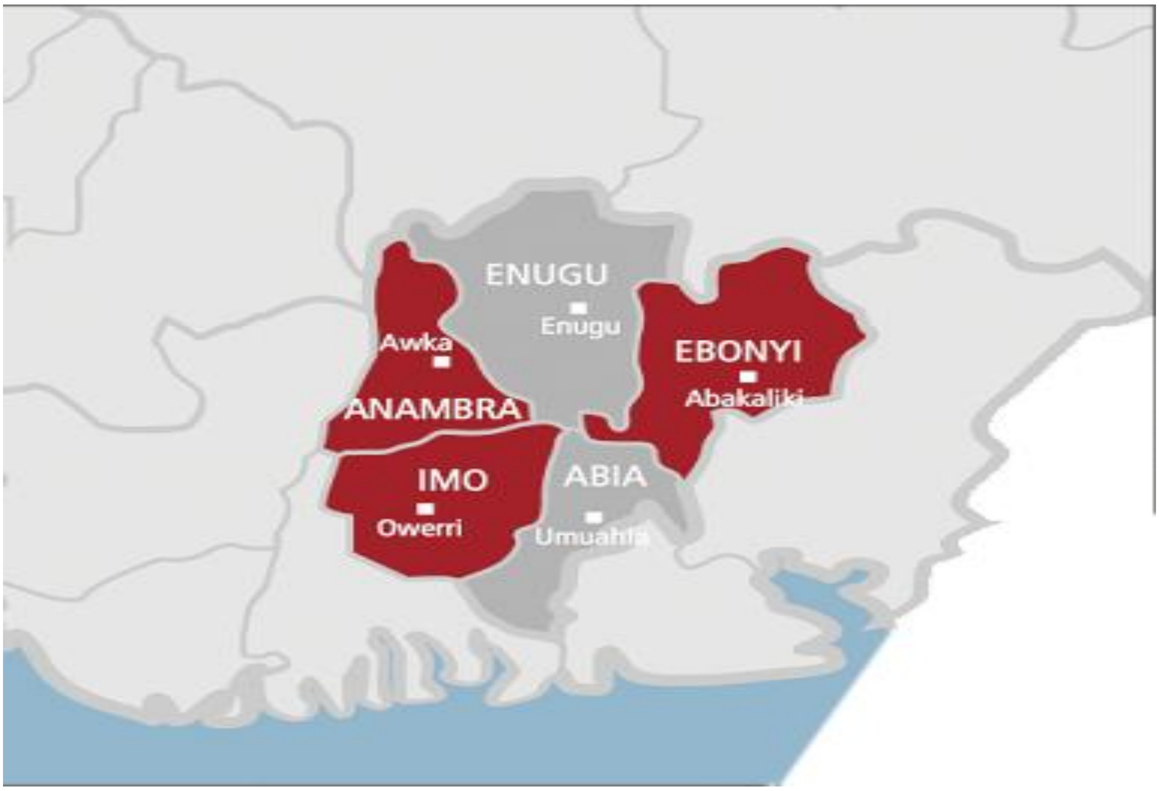


Figure 1. 1: *South Eastern Zone of Nigeria with State Capitals*

1.8 Limitations of the Study

The limitations of a research work are shortcomings that cannot be controlled by the researcher which place restriction on methodology and conclusion. The research work used secondary and primary sources of information. Responses to questionnaires are often exposed to positive or negative responses that might have been given wrongly. The research is aware of this tendency and solicited for objective responses to the questionnaires from the participants in order to enhance data quality and greater information. The findings of this research may not be generally applied in a different location. In spite of any unforeseeable limitations, the results of the research will be very useful for the purpose it is intended to serve.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Conceptual Review

Energy is capacity of matter to perform work as the result of its motion or its position in relation to forces acting on it. We use energy for everything we do, from making a jump to sending astronauts into space. The same concept according to Tejada-Bailly (1981) can be expressed as the amount of heat that must be transferred, exchanged or used up to effect a process or deliver a good to a particular point in the economic system. Energy therefore refers to access to source to the benefits derived from the source of it and services that it provides to manufacturing, industrial and household. It is a single most important component of any development strategy and none of the Millennium Development Goals are capable of realization without the use of efficient energy, this is because it has direct link to rapid modernization (Omeregbe, 2014).

2.1.1 Energy Supply and Business Growth

Business Growth is a stage where the business reaches the point for expansion and seeks additional options to generate more profit. Business growth is a function of the business lifecycle, industry growth trends, and the owners' desire for equity value creation (Attract Capital, 2018). It is about expanding our products, services and target markets. Growth in energy supply sub-sector is a requirement for business, and in order to grow nation's revenue and profitability for economic growth.

Economic growth is an increase in real Gross Domestic Product (GDP) per capita occurring over some time period (McConnel, 2005), the increase in the inflation-adjusted market value of the goods and services produced by economy overtime. It is conventionally measured as the per cent rate of increase in real gross domestic product, or real GDP. The absence of energy deprives the citizens of a nation the bare minimum living standard; it constraints business and productive activities, results to economic limitations, and other constraints to the development of Nigeria. Nigerian economy and rapid growth of the population accompanied by a surge in the demand for household electricity, the pattern of energy use which varies with the citizen's economic status has been one of the major challenges in the energy supply. The Economists interest has been on efficacy of energy growth nexus in the country. High energy consumption/supply per capita is an important indicator of economic modernisation and growth (Adegbemi, Adegbemi & Babatunde, 2013). The gap between demand and supply of electricity can be traced to the ineffective and inadequate nature of facilities to boost supply.

Technology is the ability to access information and understand how to apply it in the work system. Technological improvement has done a lot to ensure the production of capital, and energy generation is one of the goods for the man. The world has become easy and exciting to live in because what energy has created and made available has ensured growth of social interaction, and business growth. Modern energy has been seen as the key to human development in every ramification (Chikwendu 2011). The growth of the economy would be sustained and improved upon through the availability of modern energy and there is no sector of the economy that is independent of modern energy supply (Chiejina 2012). Lack of technical competence has been a major constraint in development of renewable energy systems in Nigeria; and to adapt technologies to local conditions, resources and requirements.

2.1.2 Energy sector and Micro, Small and Medium Enterprises (MSMEs)

Micro, Small and Medium Enterprises (MSMEs) are very crucial to economic growth and general welfare. They have been acknowledged to be the engines of economic growth and business development in the areas of employment, wealth creation, poverty alleviation, and food security. In terms of number of enterprises, about 95 per cent of firms in the organised manufacturing sector are SMEs (Anudu 2013). Infrastructure development has become imperative in order to increase energy supply and for this to happen there is need to massively invest in procurement or production of new infrastructure. However, the exorbitant cost of undertaking such projects has proved to be a barrier.

Industrial production measures these output of the overall productive activities of the industrial sectors (Awosipe, 2003). This sector is one of the major energy consuming sectors and inadequate supply of energy would contribute to low industrial capacity utilization. The sector is involved in the use of machines to manufacture or convert raw materials into finished goods for sale to businesses or for export. Export promotes manufacturing sub-sector, business development, economic growth of nations and increased foreign exchange earnings. Import is bringing in of goods/services from a foreign country for use, sale or re-export. Importation of goods and services stimulate business relationships, develop and enhance infrastructural production designs. Chukuezi, (2009) stressed that the high rate of industrial growth of any country is a function of the amount of energy available in that country and the extent to which this energy is used. These inestimable roles that energy plays in human and business development probably underscored the Millennium Declaration. Energy services interface in basic survival activities to increasing productivity. Energy supply is one of the most important sectors in the industrial economy, and it requires continues investment in the area of maintenance for the plants and replacement when obsolete.

2.1.3 Energy Generation and Business Growth

Electricity generation in Nigeria began in 1896. The Nigerian Electricity Supply Company (NESCO) commenced operations as an electric utility Company in Nigeria in 1929 with the construction of a hydro electric power station at Kurra near Jos. The Electricity Corporation of Nigeria (ECN) was established in 1951, while the first 132KV line was constructed in 1962, linking Ijora Power Station to Ibadan Power Station. The Niger Dams Authority (NDA) was established in 1962 with a mandate to develop the hydropower potentials of the country. However, ECN and NDA were merged in 1972 to form the National Electric Power Authority (NEPA). In 1998, NEPA ceased to have an exclusive monopoly over generation, transmission, distribution and sales (Agagu, 2000).

Bacon, 1995, described the principle behind the energy reform movement in the developed and developing countries and said that part of it was capital scarcity and economic inefficiencies. The primary motivation for re-structuring in developed countries is to improve the operating efficiency of existing capacity and impose economic discipline on new capacity investment decisions in slower growing markets with more than adequate generation capacity and extensive transmission and distribution networks. These divergent motivations make re-structuring a higher risk activity in less developing Countries, using the Latin American Countries like Chile, Brazil, Columbia, Hondrus, and Brazil as example that dealt with related issues like dispatch of generation and energy shortages relative to demand at the prevailing retail price (Fisher and Galetovic, 2001).

When a business begins to sell more products or generate more service income, the business brings in more money and is considered to be growing. When a business is able to cut costs and net more money from raising profitability, it also grows. Successful businesses have success in both areas, and success in one area (especially in the area of efficient energy supply) often leads to another and is sometimes able to get a better price for its goods, which reduces overhead. When overhead is reduced, businesses pass on savings to the customers and attract more sales. The energy supply has chain reaction to business operations and activities (Business Dictionary.Com, 2018).

2.1.4 Energy Sector Reform, Labour and Exchange Rate

Energy Sector reform was intended to promote and deliver infrastructural services that is expected to enhance economic growth. When there is serious slide in the Energy supply, it ultimately affects the manufacturing, and industrial sub-sectors of the economy indicating that labour and capital are not maximally optimized and employed within the nation (PHCN, 2004). Manufacturing and Industrial sectors need constant and steady power supply in order to meet their installed productive capacity. Technology is also essential in a Nation's business and economic growth. Industrial production sector is used as an independent variable that gauges the output of the activities of the sectors in Nigeria. Manufacturing variables are the total raw material that was converted to finished commodities and exports help to promote both the manufacturing sub-sector and ensure the speedy growth of the economy.

Labour is the total number of people engaged in an employment or seeking for employment over periods of time (Awosipe, 2003). Importations of essential raw materials need for the manufacturing sub-sector and other relevant goods and services enhance infrastructural development. Exchange rate is the price of other nations' currency vis-a-vis the country's currency presented for exchange. It is also important to note that in order to achieve sustainable energy reform there are needs to have the following: competitive power markets, strong and vibrant independent Regulatory Commission, steady inflow of exchange earnings, enhanced generation and distribution of energy supply, and high infrastructural services such as Technology that would help the system function optimally. The generic principal-agent model is presented and it is applied to illustrate the incentives for the electricity sector behaviour under regulation versus competitive market environments.

2.1.5 Energy Sector and Business Development

Business Development is about bringing discontinuity into normal operations of an organisation and it is development of new things the organisation did not do before, and it is when organisations have to decide whether to make or to buy certain organisational competencies (www.the unlimited net March 9, 2007). It also involves business expansion, strategic partnerships, and making business decisions. Business development involves high level decision-making based on a realistic assessment of all potential changes and their impact as applicable to the energy sector. Through new ideas and initiatives, it aims to improve the overall business prospects of the sector. It is the eco-system encompassing the entire business and its various divisions, driving overall growth of the economy. The level of development of business in South Eastern Zone under Enugu Electricity Distribution Plc is further elaborated under.

Enugu Electricity Distribution Plc, or **Enugu Disco**, located in Nigeria's South East zone, distributes and markets electricity in franchise area that includes Abia, Anambra, Ebonyi, Enugu and Imo States. The franchise area further sub-divided into 10 districts, namely; Aba, Abakaliki, Abakpa, Awka, Ogui, Onitsha, Orlu, Owerri, Nnewi, and Umuahia. The Aba and Onitsha districts are two major domestic commercial industrial centers of South Eastern zone of Nigeria. Within the zone, Enugu Disco owns and maintains electrical installations and the distribution network, manages meter installations and servicing, billing, co-ordinates consumer credit services, and collects revenue.

Enugu Disco is Nigeria's second largest distribution company in terms of its customer base and the fifth largest in terms of electricity sales. In the past two years, Enugu Disco completed a programme of extensive rehabilitation, 'network enhancement, and maintenance'. As a result of these operational improvements, Enugu Disco's bulk distribution capacity increased to 52 per cent from 467.25MVA to 710.75MVA. In 2005, Enugu Disco intensified collection efforts with installation of pre-payment meters, route sequencing, bulk, and feeder-by-feeder energy audits, beginning with Aba and Onitsha business units.

Enugu Disco is one of 11 such distribution companies comprising a national distribution grid. The Transmission grid, in turn, is managed by a separate company, the Transmission Company of Nigeria (TCN) Plc, from a national control center at Oshogbo, and a supplementary center at Shiroro. In 2005, Enugu Disco delivered a total of 2,176,727,310 Gwh of electricity to 768,245 registered customers, generating N7.465 billion as revenue. Enugu Disco's customer base includes 4,069 maximum demand and 764,189 non-maximum demand users. In 2005, monthly revenue increased to N575 million from N495 million in 2004 and N392 in 2003.

The reforms in the power sector have seen increased participation of private sector participation. 55 licenses have been issued to private entities since 2000. Of this number, 20 small private electric power generation plants are operational, while 9 are under construction. The biggest challenge faced in generation is insufficient investment over the past years and low fuel. Energy-Power plants in Nigeria (A 10 generation plants) built under NIPP, a fast-tracked scheme launched in 2004 to build government-funded, gas-powered plants during the implementation of the 2005 Electric Power Sector Reform Act. The plants have reached a total design capacity of 5,454 MW, are owned by the Niger Delta Power Holding Company (NDPHC) and located in the gas-producing Southern States and Eastern zone of Nigeria (*Natural Earth, African Development Bank, 2015*).

Transmission – Nigeria’s transmission network splits into two types, that is, a 330 KV network and a 132 KV network, and for each network, there are two elements of basic transmission lines and transmission substations as at 2009/10; Nigeria possessed 5,524KM of 330KV (Energy TWG, 2015).

Energy – Power lines in Nigeria at the moment faces losses in energy transmission (including distribution) of as much as 30 per cent due to deteriorating transmission lines as a result of the need for better maintenance. The current grid began to face technical constraint once it goes above 5 to 5.5 GW capacities. There is critical short-term need for transmission and 6,802 KM of 132 KV lines. There are 32 330/132 KV substations spread across Nigeria with total installed transformation capacity of 7,688 MVA. The available capacity of 330/132KV transmission network is about 96 per cent of installed capacity. The ongoing projects by the Federal Government and NIPP are expected to increase the length of transmission lines by 6,577 km of 330 KV lines and 1,514 km of 132 KV lines and to also increase the capacity of 330/132 KV and 132/33KV transformers by 6,940 MVA and 4,663 MVA respectively. The proposed construction of 10 new 330/132 kV substations and 7 new 132/33 kV substations, as well as the expansion/reinforcement of 32 existing 330kVand 13 existing 132 KV substations will also boost the transmission capacity of on-grid power in the short-term (Energy TWG, 2015).

Distribution - Distribution energy infrastructure is made up of distribution lines and substations of varying capacities. The total length of 33 kV, 11 kV and 0,416kV distribution lines as at 2009/10 was 37,173 km, 29,055 km and 70,799 km respectively. There were 102, 132/33/11 kV sub-stations with a combined installed transformation capacity of 9,130 MVA. The available capacity of these distribution networks averaged 94.1 per cent of installed capacity as (8,448 MVA).

Enugu Distribution Company Plc was established as a public limited liability company on November 7th 2005. In July 1, 2006, Enugu Disco became a stand-alone company a step toward privatization.

2.1.6 Energy Supply and Manufacturing Sub-sector

In the South Eastern Zone of Nigeria there are so many industries, sea ports, oil deposit and oil companies; and energy supply (Power supply) is considered as essential and key element of modern industrialization especially in the Eastern Zone where most of their activities notably are driven by power in every aspect like iron-welding that has increased dominance of electricity usage. Industrialization is the transformation of a society from an agricultural based society to that of the manufacturing of goods and services.

Energy supply, today, are needed for communication, internet, running of factories, hospitals, water Board for water treatment etc. For Nigeria to meet up with their development plans of industrialization there is need to boast the nation's energy supply directed towards those essentials that drive the business development.

A business is an enterprising entity engaged in commercial, industrial or professional activities. A company transacts business activities through the production of a good, offering of a service or retailing of already manufactured products.

Business Development is the activity of pursuing strategic opportunities for a particular business or organization and it is primarily measured in terms of its impact on people. Business development is accompanied by interventions on the artisans and small businesses. Development hinge on what socio-economic goals are being advocated by the development agency, government or analyst who are involved in desirable changes in the economic, political and social conditions of the society. According to Pearce and Warford (1993), such attributes include access to energy products.

2.1.7 Energy Supply, Industrial Production and Technological Advancement

In Nigeria there are so many industries, sea ports, oil deposit and oil companies; and energy supply is considered as essential and key element of modern industrialization in Nigeria where most of their activities notably are driven by power in every aspect like iron-welding that has increased dominance of electricity usage. Industrialization is the transformation of a society from an agricultural based society to that of the manufacturing of goods and services; this could bring about inventions that stem much expansion, as well as new technologies.

Nigerian Energy Regulatory Commission (NERC) scored the eleven (11) Distribution companies (Discos) and other Generation companies (Gencos) low, mostly for their poor data submission. Abdullah, (2016), believed that the Discos under performed as their average 55 percent Aggregate Technical Commercial & Collection (AT&C) losses was unacceptable as only 17 per cent was projected in the Multi Year Tariff Order (MYTO). He expressed that their customers' metering level had fluctuated from 46 percent to about 44 per cent which he stated may be due to wrong data submission to NERC, variation in the number of customers and meter installation statistics. The Generation companies (Gencos) had their electricity output go down from 70 per cent earlier in 2005 to less than 65 per cent with more stranded (unused) power. NERC also frowned at the Transmission Company of Nigeria's (TCN) non-submission of its six months performance between January and June of 2015. He expressed the need to improve the performance in the sector by making sure that the licensees' live up to their responsibilities. Bello (2016) stated that the 11 electricity distribution companies made commitment of metering about 1,640,411 customers have so far been metered between January and October 2016. The Distribution Companies blamed their inability to make substantial progress as regards metering their customer to high foreign exchange rate, and that the present tariff they have are not cost reflective as they are being regulated.

Generation

To meet the Vision 2020, Government has set a generating target of 40,000MW. To attain this projected increase in capacity will require large investments which may be beyond the resources available to Government. In view of this, private sector participation will be necessary to achieve this growth. Government is therefore encouraging International Oil Companies (IOCs) operating in the country to embark on Independent Power Producers [IPPs], as part of the reform. The IPPs will not only boost electricity supply but also provide necessary infrastructural support for business and economic growth that would guarantee additional revenue to the participating IOCs.

To encourage private participation in this process, Government should put in place the following:

- A cost reflective tariff to guarantee return on investment
- A credit enhancement programme and incentives
- Fuel availability

Transmission

Investment is required in the Transmission network. The Government's target to raise transmission capacity from 330 kilovolt to 700kv is being aggressively pursued as it has made investments of US$3.5 billion for construction of a 700 kv super transmission grid that would enable power generation companies to transmit more than 6000MW of electricity. This transmission grid is to be retained by Federal Government of Nigeria [FGN] and managed via a management contract. It is imperative that new investments are pushed forward as rapidly as possible. To that end, the Transmission Company of Nigeria (TCN) management contractor will be responsible for significant investments in the expansion, reliability and stability of the network infrastructure.

Distribution

The distribution network has to grow at the rate of at least 6% each year in order to meet the anticipated electricity demand of the nation by 2020, however, the current average growth rate per annum is less than 1percent due to limited investments in new networks. Investments in distribution networks are usually ploughed into replacements of damaged equipment (transformers, switchgear, etc), instead of going into new constructions for expansion and upgrades.

The immediate distribution target of the Government is to:-

- Increase the capability of the distribution network by roughly 20%
- Reduce aggregate distribution losses (technical and non-technical) by at least 5%
- Secure a noticeable increase in the average number of hours of electricity supplied to consumers.

2.1.8 Energy Sources

Oil: Crude oil was discovered in commercial quantities in Nigeria in 1956 while oil production started in 1958. Nigeria had a proven reserve estimate of about 32 billion barrels of predominantly low sulphur light crude, as at January 2002. Oil will continue to play a major role in the nation's economy. As at 2012, Nigeria's oil reserves stood at 36.6 billion barrels while the gas reserves was 182.8trillion cubic feet. Crude oil production delivers an average of 2.5million barrels per day (mbpd). Nigeria installed refining capacity is 445,00 bpd, but the actual output of the refineries is as low as 45,000bpd, which is insufficient to meet national demand and necessitates import. Current capacity utilization is just above 30 per cent (Energy, TWG 2015). The average refining capacity utilization of the country's four refineries has fluctuated from 47.55 per cent of installed capacity to 20.82 per cent. These *fluctuations* constitute challenges in the sector.

Natural Gas: Nigeria's proven natural gas reserves, estimated at about 163 trillion standard cubic feet, are known to be substantially larger than its oil resources in energy terms.

Tar Sands: These exist in Nigeria and the deposit is preliminarily estimated to contain a total reserve of about 30 billion barrels of oil equivalent. Tar sands can be refined similarly to heavy crude.

Coal: Available data show that coal of sub-bituminous grade occurs in about 22 coal fields spread in over 13 states of the Federation. Proven coal reserves so far in the country are about 639 million tonnes while the inferred reserves are about 2.75 billion tonnes, consisting approximately 49 per cent sub-bituminous, 39 per cent bituminous and 12 per cent lignitic coals.

Nuclear: Nuclear energy is one of the major sources of base load electricity generation in the world today.

Hydropower: Hydropower is one of the major sources of base load electricity generation. Despite its high initial capital cost, hydropower provides one of the cheapest and cleanest sources of electricity. Nigeria is well endowed with large rivers and natural falls with good hydropower potential.

Solar: Solar energy can be harnessed as a source of electricity, which is clean and renewable. Nigeria lies within a high sunshine belt, where solar radiation is fairly well distributed.

Biomass: There is a large potential for biomass energy in Nigeria.

Wind: The annual average wind speed at 10m height varies from 2m/s in the coastal areas to about 4m/s in the far northern region of Nigeria. Thus potential wind power is abundant.

2.1.9 Market Design for Electricity

The Nigerian market is expected to evolve through the following stages:

Pre-Transitional Stage: This is characterized by inadequate and unreliable supply of electricity.

Transitional Stage: This is characterised by demand exceeding supply; all trading is made through contracts; the conditions and prices of vesting contracts are not freely negotiated; there are transparent and competitive mechanisms for entering in the market (new PPAs).

Medium Term Stage: This stage is characterized by competition to enter into the market to supply demand; contracts can be negotiated freely and power can be traded like a commodity (financial contracts); there is a centralised merit order dispatch (energy at least cost is dispatched first) by the System Operator, where Generators must submit the dispatch nomination (availability, constraints, costs/prices) to be used in the security constrained economic (least cost) dispatch. At this stage, the Nigerian Energy Sector should be on an irreversible path to self-sustaining mode, equivalent to Telecom sector operation today.

Long Term Stage: This stage is similar to the medium term stage but characterized by more competition and greater freedom by eligible consumers to choose their suppliers/distributor.

2.1.10 Energy Policy for Nigeria

In order to ensure optimal, adequate, reliable and secure supply of energy to the country, and its efficient utilization in the country, it is essential to put in place a co-ordinated, coherent and comprehensive energy policy. In Nigeria, over-dependence in oil has slowed down the development of alternative fuels. The Energy Commission of Nigeria has recognised the need for diversification to achieve a wider energy supply mix in order to ensure greater energy security for the nation. Sambo (2008) acknowledged that adoption of energy efficiency and conservation of energy would help mitigate the supply challenge in the country.

2.1.11 Energy-Power Reform in Nigeria

Reform in the Nigerian Energy-Power becomes imperative and expedient when National Electricity Power Authority (NEPA) started manifesting inability or inabilities to achieve its goals and obligations to the citizens due to various factors like quality output/service and being eaten up by corruption. It is in this respect that the need to attract private sector investment becomes expedient in order to find way[s] forward and also to reposition the organisation. The enactment of the Electricity Power Sector Reform Act was in 2005 was passed to reposition it and the ongoing reform kicked started thereafter. This is because it has become a global trend and it helps to remove gross inefficiencies, dependence on government for funding, among other lapses. From January to August, 2015, Nigeria has 12.5GW of installed capacity, but less than average of 3.9 GW is operational in 2015; 3.2 GW in 2016. Overall, only about 15 per cent of installed capacity is distributed to end users, resulting in a huge shortage of electricity supply across the country (ERGP, 2017).

The Nigerian energy sector is characterized by numerous Challenges particularly with area of power generation, transmission and distribution. This was widely acknowledged and it created gap between demand for and supply of electricity. The reform is expected to reduce costs through efficient supply of energy, introduction modern technology, opening the nation to foreign expertise in the areas of energy technology. This will enhance and led to improve, reliable and steady power supply (World Bank, 2008). The involvement of private investors will help to ease government of some direct financial and governance thereby concentrating on providing enabling environment for the investment to thrive.

The Energy restructure enables countries regulatory Commission to undertake course(s) where they share experiences on how to make their energy sector vibrant. This kind of engagement strengthens regulatory institutions including wider economic benefits for improved productivity. The major factor driving reform in Nigeria is to improve the quality and reliability of electricity supply that negatively affects the domestic and economic lives of the people. The influence of this on the behaviour of both the energy and economy is also addressed using this model. An enormous number of bilateral economic and business interactions fit this generic principal-agent framework. For example, a firm owner designing a compensation scheme that causes the manager to maximize the value of the owner’s assets subject to the constraint that the firm manager will take actions to maximize her payoff given the scheme is in place and the fact that it must provide a higher payoff to the manager than she could receive elsewhere. This modelling framework is also useful for understanding the incentives for firm behaviour in a market environment. A competitive market is another possible way to compensate a firm for the actions that it takes. Viewed from this perspective, markets are simply another regulatory mechanism for compensating a firm for the actions it takes. It is well known that profit-maximizing firms participating in a competitive market have a strong incentive to produce their output in a technically and allocatively efficient manner (Wolak, 1999). However, it is also known that profit-maximizing firms have no unilateral incentive to pass on these minimum productions cost in the price they charge to consumers. It is when competition among firms is sufficiently fierce that this will occur.

2.1.12 Business Development and Capacity Utilization

Business development is an ever-evolving concept and at its basic level business development is defined as growing a business by making it more competitive, expanding products or services, and/or focusing on specific markets and is the practice of growing a business beyond its current state. There are three main components that business experts generally agree form the base of business development: **markets**, **customers**, and **relationships**. In order to grow a business beyond its current state, the type of business and the direction of growth determine where the focus is placed.

A great deal has been published of late concerning privatization in Nigeria, public companies because of consumption and management by public servants and private individuals on how to develop and implement a successfully Private-driven businesses/organisations, by developing a marketable project and attracting the right partners. There is a fair amount of agreement that the boom that followed the Yom Kippur war of 1973 when the receipts from oil quadrupled injected much confidence into the public sector about its central role in business and economic management. This new philosophy of the oil boom era was encouraged by the fact that indigenes at that time were generally capital deficient and could not afford to invest adequately in most industrial ventures. This inadequacy left the commercial sector largely in foreign hands, making the indigenization programme inevitable if Nigerians were to have meaningful role in the economy. The government of the day felt it had an obligation to hold a state in trust for the people of Nigeria.

Kilduff and Tsai (2003) explain in their tier-level theory that links between networks and their implications. According to the theory, people are connected to each other through organizations, while organizations are connected to each other through people. This kind of network does influence on the successes or failures of projects. ‘’Regulation by contract’’; how different Countries have handled some key regulatory issues through this mechanism; describes the strength and weaknesses of different approaches, drawing on international experience (Bakovic, Tenenbaum & Woolf, 2003).

2.1.13 Energy Sector Reform and Business Development

The Reform of the energy sector ultimately will enhance small scale and large business activities. The cost of doing business will reduce and investors are sure of recouping the cost of their investments optimally. Okafor (2005) was of the view that reform has ability to touch and affect individual lives and has capacity of introducing market driven participation that could be provided by the private sectors. This has the potential to strengthen the economy, and the effect further run as follows:

Services: Nigeria ranks 63rd worldwide and 5th in Africa in services outputs. Low energy density has crippled the growth of this sector.

Transport: The efficiency of publicly-owned transportation infrastructure such as ports and airports is dependent on effective energy supply system.

Labour Force: The labour employment sector by sector is 70 per cent in agriculture, 20 per cent in services and 10 per cent in industry. The work-force requires energy for improvement in the general standard of living, personal care and hygiene in addition to cleaner, conducive and safe working environment. The level of unemployment is put at more than 10.8 per cent overall, urban employment is 12.3 per cent which exceeds rural unemployment at 7.4 per cent according to the 2005 statistical figures.

Human capital: Human capital is an important factor for the wealth of a nation due to its influence on the overall production of the country. Technological advancement can only be possible through skilled labour. Human development indexes (HDI) provide measure of human capital development in three dimensions. The latest value of HDI shows that Nigeria is ranked 156 with the value of 0.459 among 187 countries. The value places Nigeria in the bottom, meaning that Nigeria is considered to have a low level of human development. The comparative value for sub-Saharan Africa is 0.463, compared to 0.910 for USA and 0.662 for the world average.

Economic Reform: The reforms in information technology and communication, Oil & Gas, Aviation, Agriculture, could only be successfully accomplished if there is effective and efficient energy system.

Investment: Foreign investment is essential to realizing Nigeria‘s vast potential. Efficient energy sector will encourage companies both foreign and local to be interested in long-term investment and joint Ventures especially those that use locally available raw materials, will find opportunities in the large national market. Inflows of foreign portfolio and direct investment are a function of the country’s energy sector. To be competitive, one has to produce at a cheaper cost, and absence of energy supply leads to high cost of production. In recent times there has been a strategic policy shift from the previously held belief that the development and financing of the energy sector is solely the responsibility of the government. This explains why there has been a gradual but steady participation and involvement of private sector investments resulting from government reform and privatization. The Energy sector reform by the government is meant to address the inefficiency of government owned and public sector-managed power projects and to relieve the government of the enormous financial burden involved is a step in the right direction for catalyzing business development in the South Eastern Zone and Nigeria as a nation. There is the need to complement government's effort by attracting required private sector involvement especially through the support of the generating companies (Gencos) and distribution companies (Discos) in order to fortify their funding base and to make them more efficient.

2.1.14 Energy Sector Reform in India

The reform in India began from the distribution end of the production chain for sustainable development of power. The process of distribution reform started with the enactment of regulatory act in 1998 to minimize the political interference in power sector and rationalize the tariff. In pursuant to reforms, states started unbundling the vertically integrated structure of State Electricity Boards (SEBs) into three separate corporate identities of Generation, Transmission and Distribution. This was as a precursor to the participation of private sector in distribution, learning from the Orissa experience, the measure and criteria for choosing companies was not based on valuation, but on performance improvement goals. In order to promote competition in the electric power sector, the Electricity Act 2003 (E. Act) mandates open access to the transmission and distribution network for any supplier of electricity. Successful implementation of structural reform requires both the hardware of technological advances in the power system and the software of workable contractual relationships. Utilities need to make efforts to identify such links/areas of high losses; there is still significant uncertainty and differences over the real level of total as well as transmission and HT losses even three years after the establishment of States Electricity Regulatory Commissions (SERCs).

World Bank (1996) in its research paper "Power Sector Reforms in Developing Countries and the role of World Bank" discussed the experience of the banks with the energy sector, the expected benefits of reform, the formulation of the bank's policy in this area, the principles and elements of reform, the methodologies of bringing about reform. The paper also discussed issues of implementation, lesions of experience, and the role of the bank in the reform effort that needed to be governed by set of clear objectives. These were meant to increase efficiency in generation through competition, maintain service reliability, and increase the security of supply in terms of numbers of suppliers, improve environmental protection and attract capital, domestic or foreign, by establishing clear and stable "rules of the game" that would relieve the government's burden of funding the sector.

Asian Development Bank (ADB) 2001-2002 in its research which acted as blueprint for "Power Sector Development" identified the fault lines and has found the probable reasons which have emanated from: inadequate power generation capacity; lack of optimum utilization of the existing generation, the introduction of a new system of matching time and load profiles for different zones in the country. The Energy Conservation, that is, the Ministry piloting the energy conservation and efficiency, evacuation of power from the power surplus eastern region to less surplus region.

Sankar, (2002), Advisor energy, Administrative Staff College of India, Hyderabad, in his work on "Power Reforms in India – The Search for an Indigenous model for Promoting Competition" has identified the major problems as: the slow rate of addition to power generating capacity, lack of improvement in the governance, management and level of service to consumers; and the failure of efforts to induce the private sector.

Abraham, (2003), ex-power secretary, Government of India in his work on Power Sector Reforms; Focus on Distribution and has stated that it is one of the prime movers of the economic development. In his work, he has identified that non-availability of sufficient power had constrained the overall development of the country. Power distribution throughout India was plagued by inadequate and deteriorating physical infrastructure, poor collection of revenues etc. The budgetary provisions of the state governments were sliding/reducing and the gap between demand for and supply of electricity was ever increasing; and the gap between cost of supply and tariff was also widening. He stressed on the need for a comprehensive and accelerated reforms based on the global experiences particularly from South

American Nations, USA, UK, Canada etc. He further advised on the need of choosing right kind of reforms model among the laid down models.

Ranganathan and Rao (2004), on "Power Sector Reforms in India" have analyzed the progress of the reforms in India which started with economic liberalization in 1991-1992, though the impetus for private sector participation was moderate, and the financial losses and cash flows of state electricity. The authors outlined the stages of power sector reform, placing the development of markets in context. They recognized the importance of manufacturing sector as it contributes significantly to the growth of the economy and helps in generating employment. For them, to be competitive, issues such as price of power, supply of it without interruptions and quality of it are all important and relevant. In the Growth of Power Sector, Global Perspective; it was outlined that many countries have started reforms in the power sector before India embarked on reforms. Notable among them were United Kingdom and Latin American countries like Chile, Argentina, Peru, Columbia, EU Nations and Australia. Their own reform programmes were based on country's governmental structure, demographics, socio-economic and political environments. But it was clear that those countries had undertaken restructuring electric utilities for improving the efficiency, reducing tariff and to provide better quality of service to consumers, through competition and consumers would gain from efficiency gains in generation, transmission and distribution.

2.1.15 Energy Sector Reform in China

China's first reform of the electricity industry started in 1986 with the implementation of a scheme aimed at raising investment funding for expansion. Under the reformed system, central planners retain control over the approval of large projects (750MW) and projects with foreign investors, while smaller projects were left to provincial authorities. The aim of the second reform of the late 1990s was to separate corporation: the State Power Corporation (SPC) with its own Board of Directors. The impact of the reforms had been limited largely because SPC's board and management were government appointees. Government had been concerned about poor economic development in rural power because they had decentralized control over capital investment (Zhang and Heller, 2006).

In the late 1980s and early 1990s, China's power industry was struggling with a large nationwide debt and very limited domestic funding for large infrastructure projects, at both central and local levels. The domestic capital market was undeveloped. Consequently, reform was initiated to promote private participation especially from the foreign private sector in infrastructure projects. Under the reform programme, series of projects were executed in the form of Build-Operate-Transfer (BOT) power plants. An example of the type of plant is the 720MW Laubin B power plant, in Guangxi Province, built by EDF Asia, pursuant to a concession agreement awarded in 1996 through a competitive bid process. By 1998, a total of 24 plants financed with Foreign Direct Investment with a capacity of 4.9GW were in operation, and other similar financed plants with a combined capacity of 9GW were under construction. Although, there had been some foreign capital in China's power sector prior to the reform program, however, following the instigation of the reform programme, FDI in the sector successfully helped to fund an additional 21 major plants involving a total of USD8.5 billion between 1995 and 1998. As part of the reform programme, significant changes were made to the pre-existing legal framework, particularly in regard to FDI. The State Planning Commission and the Ministry of Electric Power designed specific rules and model contracts that would facilitate such projects better. The most significant change during the reform was the rapid increase in domestic liquid and finance available to state owned enterprises and public authorities for infrastructure projects, this led to high growth in Gross Domestic Product (GDP) and increased growth of public revenues.

In the analysis of Indian energy sector reform, the authors highlighted the impetus private participation gives to energy infrastructure in areas of generation, cutting of financial losses, evacuation of energy from the areas of surplus to less surplus and placing significant importance to the manufacturing sector. The authors say that the reform largely depends on investment and networking, while the Chinese reform led to high growth in GDP and increased growth of public revenues.

Reviewing the Authors research, it is observed that countries adopted a model that promoted competition in energy market achieves economic efficiency and higher quality services, as well as lower consumer prices for electricity. The trend is similar to that of Nigeria and based on these premises that it would foster competition there is need to put in place regulatory framework where necessary to regulate their operations.

2.2 Theoretical Framework

2.2.1 This work is anchored on the theory of Natural Monopoly.

Thus Natural Monopoly is a distinct type of monopoly that may arise when there are extremely high fixed costs of distribution, such as exist when large scale infrastructure is required to ensure supply. Demsetz identified the problem of Natural monopolies as one with no competition in the market. A Private monopoly would exploit the market by charging exorbitant prices, resulting in creation of deadweight loss.

In 1880 there were three competing gas companies in Baltimore who fiercely competed with one another. They tried to merge and operate as a monopolist in 1888, but a new competitor foiled their plans. Thomas Aha Edison introduced the electric light which threatened the existence of all gas companies. From that point on there was competition between both gas and electric companies, all of which *incurred heavy fixed costs* which led to economies of scale.

With regard to "public" utilities, Gray records that between 1907 and 1938; the policy of state-created, state-protected monopoly became firmly established over a significant portion of the economy and became the keystone of modern public utility regulation. From that time on, the public utility status was to be the haven of refuge for all aspiring monopolists who found it too difficult, too costly, or too precarious to secure and maintain monopoly by private action alone. In support of this contention, Gray pointed out how virtually every aspiring monopolist in the country tried to be designated a "public utility," including the real estate, energy, air transport, coal, oil, and agricultural industries, etc. Some big businesses made effort to secure legal sanction for their monopolistic practices. Those lucky industries that were able to be politically designated as "public utilities" also used the public utility concept to keep out the competition. In one of the first statistical studies of the effects of rate regulation in the electric utilities industry, published in 1962, George Stigler and Claire Friedland found no significant differences in prices and profits of utilities with and without regulatory commissions from 1917 to 1932. Early rate regulators did *not* benefit the consumer, but were rather "captured" by the industry, as happened in so many other industries, from trucking to airlines. It is noteworthy, but not very laudable, that it took economists almost 50 years to begin studying the actual, as opposed to the theoretical, effects of rate regulation.

Sixteen years after the Stigler-Friedland study, Gregg Jarrell observed that 25 states substituted state for municipal regulation of electric power rate-making between 1912 and 1917, the effects of which were to *raise* prices by 46 percent and profits by 38 per cent, while reducing the level of output by 23 per cent. Thus, municipal regulation failed to hold prices down. These research results were consistent with Horace Gray's earlier interpretation of public utility rate regulation as an anti-consumer, monopolistic, price-fixing scheme. Another reason that has been given for granting monopoly franchises to "natural monopolies" is that allowing too many competitors is too disruptive. It is too costly to a community; the argument goes, to allow several different electric power producers, water suppliers, or cable TV operators to dig up the streets.

According to natural-monopoly theory, competition cannot persist in the electric-utility industry. But the theory is criticized by the fact that competition has in fact persisted for decades in dozens of US cities. Economist Walter J. Primeaux has studied electric utility competition for more than 20 years. In his 1986 book, *Direct Utility Competition:* The Natural Monopoly Myth, he concludes that in those cities where there is direct competition in the electric utility industries:

- Direct rivalry between two competing firms has existed for very long periods of time for over 80 years in some cities;
- The rival electric utilities compete vigorously through prices and services;

- Customers have gained substantial benefits from the competition, compared to cities where there are electric utility monopolies;
- Contrary to natural-monopoly theory, costs are actually lower where there are two firms operating;
- Contrary to natural-monopoly theory, there is no more excess capacity under competition than under monopoly in the electric utility industry;
- There is better consumer service and lower prices with competition, competition persists for very long periods of time, and consumers themselves prefer competition to regulated monopoly; and
- Any consumer satisfaction problems caused by dual power lines are considered by consumers to be less significant than the benefits from competition.

Primeaux also found that although electric utility executives generally recognized the consumer benefits of competition, they personally preferred monopoly. Ten years after the publication of Primeaux's book, at least one state, California, is transforming its electric utility industry from a monopoly controlled by a handful of publicly held utilities to an open market. Other states are moving in the same direction, finally abandoning the theory of natural monopoly in favour of natural competition:

- The Ormet Corporation, an aluminium smelter in West Virginia, obtained state permission to solicit competitive bids from 40 electric utilities;
- Alcan Aluminum Corp. in Oswego, New York has taken advantage of technological breakthroughs that allowed it to build a new power generating plant next to its mill, cutting its power costs by two-thirds. Niagara Mohawk, its previous (and higher-priced) power supplier, is suing the state to prohibit Alcan from using its own power;
- Arizona political authorities allowed Cargill, Inc. to buy power from anywhere in the West; the company expects to save $8 million per year;
- New federal laws permit utilities to import lower-priced power, using the power lines of other companies to transport it;

- Wisconsin Public Service commissioner Scott Neitzel recently declared, "free markets are the best mechanism for delivering to the consumer and the best service at the lowest cost";
- The prospect of future competition is already forcing some electric utility monopolies to cut their costs and prices.

The potential benefits to the US economy from de-monopolization of the electric utility industry are enormous. Competition will initially save consumers at least $40 billion per year, according to utility economist Robert Michaels. It will also spawn the development of new technologies that will be economical to develop because of lower energy costs.

The natural monopoly concepts are all on the verge of being deregulated, either legislatively *or de facto,* due to technological change. Introduced in the United States at about the same time communism was introduced to the former Soviet Union, franchise monopolies are about to become just as defunct. Like all monopolists, they will use every last resource to lobby to maintain their monopolistic privileges, but the potential gains to consumers of free markets are too great to justify them.

2.2.2 Social System Theory (Talcott Parsons, 1979)

In his social system theory of management and structural functionalism viewed an economy as a social system that interact together (the integrative function of the social system) in order to achieve a specific goal. He stated that social structures constrain choices and ultimately determines all social actions. This theory is related to **Igor Ansoff** (1965) theory that was centred on synergy which underscores the need for the whole system to interact and operate together for greater efficiency. His theory concentrated with a simple aim of producing a resource-allocation pattern that will offer the best potential for meeting the firm’s objective. The system theory considers the energy sector as an integrated entity that should be for both public and private participation.

2.2.3 Public-Private Partnership

Kilduff and Tsai (2003) identified PPP as plausible tool that would supplement scarce public resources, create more competitive environment and improve efficiencies. However, in order to encourage PPP, he stated the need to:

(i) Ensure a level playing field

(ii) Encourage private sector participation

(iii) Attract capital to fund infrastructure and related services.

The theoretical framework of the three Authors cited above gave credence to the objective of the study**,** which is on the need to involve private sector, this is to break the natural monopoly originated by existence of large scale infrastructure (Demsetz, 1968). When this is done, competition would be introduced aiming to unbundle the energy sector which ultimately create more competitive environment that will guarantee efficiency. In addition to this, there is need for public/private to work together in the energy reform operation in order to enhance efficiency of the economy, industrial production, manufacturing and overall business development of Nigeria as illustrated by Parsons, Ansoff and Kilduff.

A Public-Private Partnership is a contractual agreement between a public agency (federal, state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility (Diko, 2014). The Infrastructure Concession Regulatory Commission Act (Establishment Etc,) Act 2005 is the principal legislation for the regulation of PPP agreements over Federal Government Infrastructure. It also gives the Commission the power to make regulations with the approval of the President.

In 2009, the Federal Executive Council of Nigeria (FEC) approved a National Policy Public Private Partnership [PPP] which aims to provide adequate framework for the development of a conducive environment for private sector involvement in the financing, construction and operation of infrastructure facilities and services in Nigeria.

2.2.4 Oil and Gas Targets

The main goal of oil and gas is to advance 'gas to power' in order to meet the rapidly growing energy demand of the country. The target is to increase oil production to 4 mbpd, and increase refining capacity to a level which would meet local demand and export potential by 2043. Nigeria plans to increase its gas production capacity from 7,580 to 11,000mcfpd by 2018, 15,000 mcfpd by 2023 and 30,000 mcfpd by 2043.The increase in gas production is necessary to supply the planned gas power stations and develop other gas-based industries. Below on table 2.1 are the energy sector targets (oil and gas) for 2013, 2018, 2023 and 2043.

Table 2.1: Energy Sector Targets (Oil and Gas)

Name	Unit	Definition	2013	Target 2018	2023	2043
Production capacity - oil	*Kbpd*	Facilities required to safely and sustainably produce discovered volumes	2,500	2,750	3,000	4,000
Production capacity - gas	*Mcfpd*	Facilities required to safely and sustainably produce discovered volumes	8,000	11,000	15,000	30,000
Refining capacity	*Kbpd*	Totality of facilities required to refine crude oil	445	750	1,000	4,000
Refined products storage capacity	*billion litres*	Total stock of storage facilities/depots required to hold strategic number of days of national daily consumption	2.6	3.2	3.8	5.2
Pipeline length (refined)	*Km*	Length of pipe line installed for transportation of refined products	5,120	6,000	7,000	10,000
Pipeline – (crude oil)	*Km*	Length of pipe line installed for transportation of crude oil	3,000	3,300	3,600	4,800
Pipeline capacity – (crude oil)	*Kbpd*	Daily volumetric throughput	1.65	1.815	1.98	2.64
Pipeline capacity – (refined)	*m litres*	Daily volumetric throughput	30	38	47	60

Source: *Energy TWG (2015)*

The articulation and justification of the theories used for this work were conceived and drawn from the distinct type of monopoly such that exists when large scale infrastructure is required to ensure supply. Examples of infrastructures include: cables and grids (technology) for electricity supply, pipeline for gas and water supply, and network for rails and underground. These are associated with the fact that organizations in the energy sector need to increase competition by encouraging new entrants, by granting licenses for the establishment of new energy stations and grids across the country are released to many potential bidders that would create a fair competition for greater efficiency. Energy sector in Nigeria was operated as one with no competition (natural monopoly) and the restructure in the sector is intended to break the monopoly, inefficiency, and market failures. This is supported by structural functionalism that viewed an economy as a social system that interact together in order to achieve a specific goal (efficiency in electricity supply) which also underscores the need for the whole system to interact and operate together for greater efficiency as required in the energy sector and business development.

2.3 Empirical Review

Olaniyan (2010) in his research on the impact of the energy reforms on economic growth used Gambia and Burkina Faso. The research was for the periods of 35 years (1970 to 2005) he used Granger causality tests and co-integration analysis and came up with the result that energy reform does not cause economic growth of the Gambian and Burkina Faso.

Subair, and Oke (2008), studied the relationship in energy supply and economic development. They categorized the relationship into four on the basis of population and land space. Citing small countries with adequate energy such as Lesotho, they also mentioned Benin Republic as one with inadequate energy. While classifying South Africa and Ethiopia as big countries with adequate energy. He added that Nigeria and Benin Republic as one of the big countries with insufficient energy supply.

Kaseke and Hosking (2013), carried out a study on the relationship between energy consumption and Gross Domestic Product (GDP) in which they applied bi-directional causality and uni-directional causality in both directions, in different countries. A number of developing country-specific studies support the conclusion that energy supply enhances productivity. Using 1970-2000 panel data for South Africa, and a range of 19 infrastructure measures, Fedderke and Bogetic (2006) found that energy generation is positively related to labour productivity and total factor productivity growth in South Africa.

Akinlo (2008), in a research of energy sector on the relationship between consumption, economic and industrial growth for eight countries in sub-Saharan African used the autoregressive distributed lag (ARDL) bounds test in the study. The research finds that energy consumption is co-integrated with industrial and economic growth in Gambia, Cameroun, Ghana, Cote d'Ivoire, Senegal, Zimbabwe and Sudan. The result of the test showed a significant positive outcome on the industrial and economic growth in Sudan, Ghana and Senegal. The Author applied Granger causality test based on vector error correction model (VECM) that shows bi-directional relationship between energy consumption and economic growth for Ghana, Senegal and Gambia. Consequently, the Granger causality test revealed that economic and growth induces increase in energy consumption in Zimbabwe and Sudan. Akinlo (2008) in his analysis did not state the period covered in his investigation.

Wolak (2003), in his research work on ‘‘Designing Competitive Wholesale Electricity Markets for Latin American Countries’’ used the outcome from the Electricity Supply Industry restructuring in the United States, Europe and Austrian and New Zealand to identify the major challenges facing electricity market design processes. The result was that the extreme dependence of many LACs on hydroelectric power indicated that all the LACs with significant hydroelectric capacity had also experienced energy shortages, because it was constructed during state-owned monopoly.

Fisher, Gutierrez and Serra (2003), Stated in the effect of the energy sector reform of the economy of Chile on efficiency of businesses in an economy and the privatization of the electricity sector between 1985 and 1989. From then the proceeds and installed capacities were 4,016MW and 10,045MW respectively. The result of the research showed that unit cost of production declined, labour productivity increased, showing that during privatization businesses become profitable. The study indicated also that energy reforms helped to improve efficiency of businesses and social being of the people of Chile. The submission was not supported with any statistical evidence.

Moyo, (2012), in his study on the impact of power disruptions on firm productivity in the manufacturing sector in Nigeria shows that power outages variables (measured using hours per day without power and percentage of output lost due to the disruptions) have a negative and significant effect on productivity. The analysis for the study found that power outages have a negative and significant impact on productivity in small firms, but an insignificant effect in large firms, probably due to generator ownership patterns. According to the Manufacturing Association of Nigeria (MAN), the closure of 820 manufacturing companies in Nigeria between 2000 and 2008 was linked to the high costs of infrastructure (Akuru & Okoro, 2011). The study, in its findings focused on the effects of electricity on the unit cost of production, as an indicator of competitiveness. World Bank Enterprise Survey datasets, which include data on total sales and costs, were analysed to determine whether firms with different characteristics have higher unit costs when exposed to outages. Total unit cost was defined as costs of a fraction of sales. This holds for SMEs that use generators during power outages, despite their higher cost of electricity, and it is consistent with that reported by Cissokho and Seck (2013) for SMEs in Senegal.

The model in Barro (2004) for the Mexico reforms on the power sector and workers productivity (as cited in Noriega and Fontenla, 2005), applied time series econometrics: bi-variate vector auto regression and long run derivative covering periods of 1950 to 1994. The result of the Mexico reform was positive for two to three years, and revealed a significant effect on real output per worker. This effect was permanent for a period of twenty (20) years. Therefore, it becomes manifest only after a long while.

Borenstein, Bushnell and Wolak (2002) in their research on "Measuring Market Inefficiencies in California's Restructured Wholesale Electricity Market", stated that the major cause of the California electricity crisis was the fact that California's three large load-serving entities purchased 100% of their total energy and ancillary service requirements from day-ahead and shorter-horizon spot markets. This resulted to their making unilateral profit-maximizing mark-up of price above the marginal cost of producing electricity.

Jamasb, (2004), in the Nigerian context the discourse on the energy reform had been on and the author in his research on the impact of energy sector reform. He used data on the privatization of energy supply in Nigeria, with the result showing that the reform led to capacity utilization and lower prices. He also disclosed that the unbundling of the energy sector impacted positively on the economic efficiency and business performance of Nigeria after using the standard structure-conduct-performance model to test the effect of the market structure.

Steiner (2001), researched on the degree of private ownership of power, the effect of vertical integration and its impact on prices and efficiency in Nigeria. The impact was measured by capacity utilization rate and the reserve margin in the energy generation of Nigeria. He stated that restructuring and private ownership is expected to improve efficiency, liberalize regulation, lower industrial and residential prices ratios. His research hypothesis was tested for a panel data set of the economy from 1987 to 1996. It revealed that unbundling, that is, private ownership of generation and transmissions were significantly correlated. However, the impact on prices, the estimated coefficients on unbundling of generation and transmission are not significant. The coefficient on private ownership is not correlated with increased competition that emerged from the unbundling. The outcome of the price ratio revealed that there was a benefit associated with the energy reform. Isola (2011) revealed in his study, examining the Market Structure in the Generation of the Nigerian Electricity Industry, that countries that had adopted privatization had higher and improved efficiency than the countries that are not privatizing. Closing energy gaps will enhance business development, growth in the non-oil sector and reduce poverty.

Penrose (2003) in his research identified energy sector reform to be an instrument of inducing competition which is expected to enhance efficiency in the resource utilization. The author further stated that monopoly leads to inefficiency in service delivery. He stated that competition without regulation decreases efficiency. The author advocated that regulators should coordinate policies throughout multi country region. He was of the view that theoretical economic models, such as perfect competition and monopoly are not to be applied since it does not take into account some fundamental aspects of energy markets and industries. The author said that modelling of the market structure and firm's behaviour based on oligopoly competition theory provides clear explanation to the behaviour of operators in the energy sub-sector of the economy. He also opined that the best model for analysing energy sector reform is oligopoly model. Reviewing the assumptions, it was observed that the period covered was not mentioned.

Ndebbio (2006) opined that the level of energy production, consumption and supply determines whether a nation is industrialized or developed, and he maintained that any nation's energy consumption per-capita in kilowatt hours is proportional to its state of industrialization. He disclosed that Nigeria energy consumption performance is very poor compared to some sub-Saharan African countries. He was of the opinion that Nigeria and other African countries should work assiduously in all fronts to generate more power. His research was based on historical study.

Odularo, and Okonkwo, (2009), his research examines the two-way linkages between energy consumption and economic growth using data from Tunisia over the period 1974-2011. This research tests this inter-relationship between variables using the Johansen co-integration technique. The empirical results show that there exists bidirectional causal relationship between energy consumption and economic growth in the long-run.

Tsani (2010), in his research on the basis of time series data examines the causal relationship between energy consumption (both at aggregated and disaggregated levels) and economic growth for Greece for the period 1960-2006 and applying Toda and Yamamoto technique, the findings disclosed that unidirectional relationship between energy consumption and real GDP at aggregate levels while bidirectional relationship with exception of transport energy consumption at disaggregated levels. Another study conducted in India using time series data for the period 1971-2006 through the application of ARDL model and Toda and Yamamoto multivariate model, their findings indicates the evidence of bidirectional Granger causality between energy consumption and CO2 emissions in the long run but neutral relationship between energy consumption and economic growth which invariably implying that India could pursue conservation policies without harming economic growth.

Newbery and Pollitt (2006), examined the benefits of restructuring the Central Electricity Generation Board and its productivity. The study sourced data from the periods of 1989 to 1996 which compared the post privatization performance of the England and Wales Central Electricity Generation Board (CEGB) that was privatized in the 1990. The researchers suggest that the restructuring had enhanced productivity considerably especially in labour and efficiency gains.

Mallick (2007), researched on the reforms on the coal and natural gas consumption on the economic growth of India from the 1970s to 2005 using time series data and employing Granger causality test and variance decomposition analysis of auto regression (VAR) technique. He observed from his analysis, using VAR technique that coal consumption has a positive influence on economic growth, while natural gas and power consumption have a negative influence on economic growth in India. Mallick (2007) stated that economic growth leads to enhanced demand for the power consumption and natural gas in India. Reviewing the study, it is envisaged that there could be bi-directional causality in between economic growth and power consumption in the years ahead. Magazzino (2011) conducted similar research using time series data in Malaysia for the periods 1970 to 2009; applying ARDL bounds testing approach to Co-integration. He also applied Vector Autoregressive (VAR) techniques and Vector Error Correction Model (VECM) in the research on the long run bidirectional relationship between power consumption and economic growth in Italy. Faridula (2011) in a research of Malaysia reform, using times series data for the periods of 1970 to 2009 stated that long run bidirectional causality, which indicated that Gross Domestic Product (GDP) and energy consumption are significant to one and another in both short and long run growth in the manufacturing and industrial sub-sectors of the economy.

Ebohon (1996) reported bidirectional causality between energy consumption and economic growth for Nigeria and Tanzania. Adeniran (2008) on the other hand using aggregate and disaggregate energy consumption data for Nigeria from 1980 to 2006, applying Hsiao's Granger causality and ECM reported unidirectional causality running from GDP to coal consumption to electricity consumption and no causality between oil, gas and GDP. Consequently, for aggregate energy consumption data, total energy consumption Granger causes GDP without feedback. However, Omotor (2008) used disaggregated time series data for Nigeria's energy consumption from 1970 to 2005 and applying co-integration and Hsiao's version of Granger causality supported the feedback hypothesis thus vindicating Ebohon (1996). Odularu and Okonkwo (2009) set a new pace by including additional variables capital and labour together with the disaggregate energy consumption variables. The empirical evidence suggests that crude oil, electricity and coal consumption are positively related to economic growth.

Aliero and Ibrahim (2012), indicate absence of causality between total energy consumption and GDP using aggregate energy consumption data. From the disaggregate energy consumption data for the period 1970 to 2009, the study shows evidence of causality running from coal, petrol and electricity consumption to GDP and a causality both ways between gas consumption and GDP. Applying newly developed ARDL bound approach to co-integration using unrestricted error correction model (UECM) on disaggregated energy consumption data for Nigeria from 1980 to 2010.

Dantama and Nasiru (2012), reported a long run co-integrating relationship of petrol, coal and electricity consumption with real Gross Domestic Product. Coal consumption coefficient, although negative, but statistically insignificant while both petroleum and electricity consumption have positive and are statistically significant on business growth. An observation from the literature reveals that in most of the studies bi-variate models were used but in recent times there is growing number of studies using multi-variate model. Variables such as labour, capital, carbon-dioxide and exports are used in the multivariate model in addition to energy consumption and GDP. Results from the studies support all the hypotheses (growth, conservation, neutrality and the feedback hypothesis). These conflicting results, according to Ozturk (2010) may arise due to the different time periods of the studies, countries' characteristics, variables and the different econometric methodologies used. In the country specific studies, the common methodologies used are the Granger (1969) and Sims (1972). Johansen and Juselius (1990) co-integration and error correction model including the recently developed ARDL bound approach and the Hsiao's (1981) technique. In the multi-country studies, panel co-integration and error correction mechanism are the widely used.

Similarly, Chebbi and Boujelbene (2009), using time series from Tunisia for the period 1971 to 2004 and employing Multivariate Co-integration, with the combined results of Causality analysis and impulse response functions do not assume that energy and Gross Domestic Product (GDP) are neutral with respect to each other in Tunisia but rather indicates a bidirectional casuality between GDP and energy consumption in the long run signifying that Tunisia is an energy dependent economy.

Pradhan (2010) in his study, using the time series data from China for the period 1970 to 2007 while applying production function and causality approach, he finds unidirectional causality from economic growth to energy consumption with infrastructure and transport as additional variables which also reports unidirectional causality. Using different methodology and different time period for China, Shunyun and Donghua (2011) examines the causality between energy consumption and economic growth for the period 1985 to 2007 within a multivariate framework by applying fully modified OLS (FMOLS), the results indicate the presence of bidirectional relationship and economic growth which contradicts the findings of Pradhan (2010). Similarly, Viahinic-Dizdarevic and Zikovic (2010) apply the technique of error correction model (ECM) to investigate the role of energy consumption in economic growth from Croatia for the period 1993 to 2006, their results support unidirectional hypothesis. The findings suggest economic growth is a pre-requisite to the growth in petroleum consumption, while gas consumption justified neutrality hypothesis. However, it has been observed that electricity consumption leads to business development, economic growth and greater performance of the economy without feedback.

Shuyun and Donghua, (2011); Ma, Bin and Long (2011), suggests that energy consumption is a pre-condition for economic growth given that energy is a direct input in the production process and also, energy is an indirect input that complements labour and capital inputs (see Odhiambo, 2009; Ebohon, 1996). They further assume that there is a bidirectional or feedback relationship between energy consumption and economic growth. The implication of the bi-directional relationship is that energy consumption and economic growth are complementary. This implies that an increase in energy consumption will accelerate economic growth, and contrariwise, an increase in economic growth will stimulate energy consumption (Hou, 2009; Omotor, 2008).

Aqeel and Butt (2001), in his study of the effect of electrification reform and productivity are closely associated with direct and indirect use of energy as an input. The consumption of energy, according to him, has been among the critical indicators of the level of development of any country. He argued that energy reform induced growth in consumption policy of the Pakistan. He also observed that usually the developed countries use more energy per unit of economic output and far more energy per capita than developing countries. This reflects the adoption of increasingly more efficient technologies for energy production and utilisation as well as changes in the composition of economic activities. This, largely, needs a shift in energy use [Cheng and Lai (1997)]. When this shift in the composition of final energy use is taken into account, energy use and the level of economic activity are found to be tightly coupled. The prospect of large reduction in the energy use intensity of economic activity seems limited. So, the accelerated demand results in the scarcity of energy and increasing cost have severe implications for business development and economic growth. This ever increasing role of energy in the present day scenario underlines the need to increase the supply of energy and to find some new alternative energy sources and energy conservation techniques. In order to meet the expected growth momentum of the economy (more than 6 percent over the past few years and projected to be more in the coming years), Pakistan needs a comprehensive National Energy Plan to meet her future needs [Pakistan (2005)]. It is also clear that energy is one of the important inputs for production, conversion, processing and commercialisation activities as obtain in other developing countries.

Pakistan is also an energy intensive growing economy, and as in most other non-oil producing countries its energy needs are met by large quantities of imports. The ACGR (annual consumption growth rate) of net consumption of total energy is 6.4 per cent. The share of oil, gas and electricity is 48 per cent, 30 per cent (of which more than half is used for electricity) and 15 per cent respectively. The share of imported oil was 92 per cent of net consumption of oil in 1995-1996, which is about 44 per cent of total net consumption of energy in the country.

According to Riaz, (1984), and Chisti and Mahmud, (1990), the authors were of the views that if Pakistan would meet its growing needs of energy, both energy constraints from the supply side and demand management policies have to be resolved. The study examined Granger Causality between growth in energy consumption, GDP growth, growth in energy consumption and employment growth by employing cointegration technique and Hsiao's version of Granger Causality. To further enrich the study they also analyzed the sectoral relationship viz, petroleum, and gas and electricity consumption growth with that of GDP growth. Since energy consumed consists of both domestic and imported sources, the researchers found it useful to outline appropriate policies regarding each component. The researchers employed time series analysis which suggested some improvements in the standard Granger test. The first step used was to check for the stationarity of the original variables and then test co-integration between them.

According to Granger (1986), the test is valid if the variables are not co-integrated. Second, the results of Granger causality are very sensitive to the selection of lag length. If the chosen lag length is less than the true lag length, the omission of relevant lags can cause bias. If the chosen lag length is more, the irrelevant lags in the equation cause the estimates to be inefficient. To deal with this problem Hsiao (1981) has developed a systematic autoregressive method for choosing optimal lag length for each variable in an equation. This method combines Granger causality and Akaike's Final Prediction Error (FPE), defined as the (asymptotic) mean square prediction error1. Both the co-integration technique and Hsiao's version of Granger causality tests, were employed to determine the causal relationship between GDP and energy, GDP and various components of energy (oil, gas and electricity) consumption, and finally between employment and energy consumption. Reviewing the work of the authors, it was observed that they did not conclude the study with suggestions, going forward.

In the case of Nigeria, the empirical investigations to date comprise of different methodology (in bi-variate and multivariate framework), time period and choice of variables. Ebohon (1996) reported bidirectional causality between energy consumption and business growth for Nigeria and Tanzania. Adeniran (2008), on the other hand, using aggregate and disaggregate energy consumption data for Nigeria from 1980 to 2006, applying Hsiao's Granger causality and ECM reported unidirectional causality running from GDP to coal consumption to electricity consumption and no causality between oil, gas and GDP. However, Omotor (2008) used disaggregate time series data for Nigeria's energy consumption from 1970 to

2005 applying co-integration and Hsiao's version of Granger causality supported by the feedback hypothesis thus vindicating Ebohon (1996). Odularu and Okonkwo (2009) who set a new pace by including additional variables capital and labour together with the disaggregate energy consumption variables. The empirical evidence suggests that crude oil, electricity and coal consumption are positively related to business and economic growth.

Bihemo (2010) stated that energy is central to sustainable growth and performance of any nation's economy. He was of the opinion that policies that support cost effective power efficiency and with growth in energy supply are essential for business and economic growth. In the foregoing, some of the analysis of these authors were based on facts without applying any particular research instrument, timeframe covered, in some occasions were not mentioned.

Hwang and Gum (1992), examined the causality between energy consumption and Gross National Product for Taiwan Province of China. A bi-directional causality was observed in Taiwan for the period of 1955–1993. On the other hand, Cheng and Lai (1997) applied Hsiao's version of Granger causality methodology to investigate the causality between energy consumption and Gross Domestic Product for Taiwan for the periods of 1955–1993. The study showed that causality runs from Gross Domestic Product to energy consumption without feedback in Taiwan.

Chang Fang & Wen (2001), Energy consumption, employment, output and temporal causality. Used the evidence from Taiwan based on co-integration and error-correction modelling techniques' between 1982 and 1997. The result supported the hypothesis that energy consumption affected economic growth.

Ladu & Meleddu (2014) investigated the energy consumption and total factor productivity (TFP) of Italy. This approach allows energy consumption to be linked to technological change. The study looks at the link in Italy from 1996 to 2008 and finds that when energy consumption increases so does TFP.

Yang (2000) re-examined the causality between energy consumption and Gross Domestic Product for Taiwan using updated data for the 1954–1997 period. The finding of this study does not confirm the findings of Cheng and Lai (1997) of unidirectional causality from GDP to total energy consumption. They found evidences of bi-directional causality between total energy consumption and GDP.

Further to this, Dantama, Abdullahi and Nasiru (2012) studied and analysed the impact of power consumption on economic growth in Nigeria for the periods of 1998 to 2010 using the Autoregressive Distributed Lag (ARDL) approach. The result showed that power and petroleum consumptions are both significant on the economy. However, they did not proffer the policy to be used to get things done.

Anecdotal evidence is often used to argue that energy plays an important role in stimulating micro-enterprise. Meadows and Riley (2003) cite Rana-Deuba (2001), who argues that access to energy produced by micro-hydropower in Nepal contributed to the establishment of enterprises, including agro-processing and sawmills, as well as agriculture and service sector activities. The empirical evidence in Legros, Rijal and Seyedi (2011) supports this, though most of the enterprises established after the installation of micro-hydro schemes were established several years afterwards. Legros et al. (2011) also found that other factors, such as market access, capital availability, and skills, are critical for potential entrepreneurs to take advantage of the availability of electricity. The creation of new, home-based businesses induced by access to energy has been analysed in a number of countries using data from household surveys (Attigah and Mayer-Tasch, 2013). Some of these studies find positive correlations between electrification and numbers of SMEs, but results must be interpreted with care as the prioritisation of economically dynamic areas for electrification can lead to a bias among surveyed electrified areas compared with areas not electrified.

In South Africa, Prasad and Dieden (2007) found that MSME uptake is higher among households with electricity connections, while Dinkelman (2008) found that women in middle income quartiles were better able to take advantage of electrification for income generation. In the Philippines, a study in four provinces found 25% of households in the electrified areas are running a home business (mainly small retail shops) compared to 15% in non-electrified areas (ESMAP, 2002). Firms established after electrification may be new types of business, offering goods and services that were previously imported from elsewhere or simply been unavailable (Attigah et al., 2013).

Lemma, Massa, Scott, & Willem (2016) researched on Development Impact Evaluation: What are the links between power, economic growth and job creation? Researchers investigated the Evidence Review of East and Western Sub-Sahara Africa region and disclosed that energy plays a fundamental part in the economic growth process. They further disclosed that more than three quarters of the good quality statistical studies reviewed find a positive correlation between energy use and economic growth, and half the studies find a positive and significant causal link from energy use to economic growth. The literature also suggests that there is relationship between energy and economic growth which varies by country and within countries.

Shaari, Rahib & Rashid (2013) researched economic growth, energy consumption and role of population growth in Malaysia between 1991 and 2011. The study concludes that population growth affects energy consumption, which in turn affects economic growth.

Lau Chye & Choong (2011) examined primary energy consumption and GDP growth in 17 Asian countries from 1980 to 2006. The study concludes that there is no long-term link from energy consumption to GDP, but there are some significant short-term links from energy consumption to GDP. There are also long-term links from GDP growth to energy consumption.

Bin-Amin & Rahman (2011) researched on the energy and output in Bangladesh between 1973 and 2007.The study finds that economic growth leads to higher energy use. The study states that in Bangladesh, economic growth causes the expansion of the industrial and commercial sectors which in turn causes increased energy consumption.

Asafu-Adjayel (2010) investigated the relationship between energy consumption and economic growth of India, Indonesia, the Philippines and Thailand. The study covers 1973 to 1995 for India and Indonesia and 1971 to 1995 for Thailand and the Philippines. It finds that for India and Indonesia, a change in energy consumption has an impact on incomes, whilst in Thailand and the Philippines, as well as energy consumption impacting incomes, incomes also impact energy consumption.

Kraft & Kraft (1978), researched on the Gross National Product (GNP) and energy consumption in the USA between 1947 and 1974, the outcome was that increases in GNP led to increases in energy consumption. A number of other studies had followed, although the results over time have varied.

Chang Fang & Wen (2001), examined energy consumption, employment, output and temporal causality in Taiwan between 1982 and 1978 supported the hypothesis that energy consumption affected economic growth.

Atif & Siddiqi (2010), researched on electricity consumption and GDP in Pakistan. The study covered periods between 1971 and 2007, and finds that an increase in the use of electricity in Pakistan leads to an increase in economic growth. The study suggests that the slowdown in electricity consumption within the country has hindered economic growth. Growth in energy consumption fell from 7.6 per cent in 2006/2007 to 0.9 per cent in 2007/2008, and the study suggests this slowdown has led to a decrease in GDP growth from 6.7 per cent in 2006/2007 to 4.1 per cent in 2007/2008.

Lemma, Massa, Scott, & Willem (2016), researched on Development Impact Evaluation: What are the links between power, economic growth and job creation? Evidence Review of sub-Saharan Africa - Guinea, Nigeria and Central African Republic. The research reveals that Electricity is a binding constraint for all sizes of business. Data from World Bank enterprise surveys, which survey a sample of an economy's private sector, reveal that this is the case, especially for those businesses operating in the manufacturing sector. Electricity provision is of relatively greater concern to low-income countries and in sub-Saharan Africa. The research also revealed that Guinea, Nigeria and Central African Republic are the countries most affected by the lack of reliable and sufficient electricity.

Adom, P.K. (2011), researched on the electricity consumption and economic growth in Ghana between 1971 and 2008. The study states that Ghana's most productive sectors agriculture and services – are not energy intensive, and the industrial sector which theoretically links electrical consumption to economic growth has been in decline. As a result, electricity consumption has not been a driver of economic growth, and instead economic growth has led to greater electricity consumption.

Wolde-Rufael (2006), studied on electricity consumption and real GDP of 17 African countries. The study and analyses was undertaken from 1971 to 2001, and finds that: – In five countries there is no link between electricity consumption and economic growth; – In three countries electricity consumption has an impact on economic growth; – In six countries economic growth has an impact on electricity consumption; – In three countries economic growth has an impact on electricity consumption and vice-versa.

Shahateet, M.I. (2014), examined the energy consumption and economic growth of 17 Arab countries from 1980 to 2011. The study finds no link between the two in 16 of the 17 countries except for Kuwait, where changes in energy consumption led to changes in GDP growth.

Chontanawat, Hunt & Pierse (2006), researched on energy use and GDP in 30 QECD and 78 non-OECD countries. The data for OECD countries covers 1960 to 2000 whilst the data for non-OECD countries covers 1971 to 2000. The study uses Human Development Indicator data to rank the development of countries. The study finds that energy has an impact on economic growth, and economic growth has an impact on energy, in both OECD and non-OECD countries. However, these links are more prevalent in OECD and high-development countries.

Achibong, O.D. (2011), examined the energy consumption and economic growth of China between 1971 and 2008. The study finds that increases in GDP lead to increases in energy consumption whilst changes in energy consumption have no impact on economic performance. This suggest that China's economic growth is not determined by the amount of energy consumed within the country, but that increases in every consumption occur as a result of economic growth.

Odihambo (2010), researched on energy consumption, energy prices and economic growth of South Africa, Kenya and the Democratic Republic of Congo (DRC) between 1972 and 2006. The study finds that an increase in energy consumption leads to economic growth in South Africa and Kenya whilst economic growth leads to an increase in energy consumption in the DRC. The study also finds that in Kenya, energy prices influence economic growth whilst in the DRC, energy use influences energy prices.

Ladu & Meleddu (2014) examined energy consumption and total productivity in Italy from 1996 to 2008. The approach he used allows energy consumption to be linked to technological change and finds that when energy consumption increases so does Total Factor Productivity (TFP).

Adebola (2011), researched on electricity consumption and real GDP in Botswana from 1980 to 2008. The research tests a model where economic growth is a function of capital, labour and electricity. The study finds that long-term increases in energy consumption are associated with increases in real GDP. It also finds that capital formation has an impact on real GDP. The research stated that as the economy of Botswana is highly dependent on energy, the ability of capital to positively influence economic growth is partly determined by the availability of adequate energy within the country.

Ziramba (2013), studied on hydroelectricity, capital and economic growth of Algeria, Egypt and South Africa from 1980 to 2009. The study finds that in Algeria, changes in hydroelectricity consumption have an effect on economic growth, and changes in economic growth have an effect on hydroelectricity consumption. In Egypt, the study finds that hydroelectricity and economic growth are not linked whilst in South Africa a change in economic growth leads to a change in hydroelectricity consumption.

Bouoiyour & Selmi (2012), researched on electricity consumption and economic growth of Middle East and North Africa (MENA) between 1975 and 2010. The study finds mixed results. In two countries, there is no relationship between economic growth and energy consumption. In five countries, changes in economic growth have an impact on energy consumption, and changes in energy consumption affect economic growth. In two countries, a change in energy consumption leads to a change in economic growth. And in three countries, a change in economic growth leads to a change in energy consumption.

Dlamini Balcilar, Gupta & Inglesi-Lotz, (2013), researched on electricity consumption, electricity prices and economic growth of South Africa from 1971 to 2009. The analysis finds that from 2002 to 2003 and from 2005 to 2006, a change in electricity consumption leads to a change in GDP. In other periods of time, electricity consumption and GDP are not linked. The study presumes that the two exceptional periods correspond to periods of particular economic significance within the country's electricity market where increases in electricity tariffs occurred. The study also states that in the two periods, growth in electricity consumption led to growth in GDP but the observed effect was negative due to increases in electricity prices.

In the Philippines the variety of enterprises was greater in electrified areas (ESMAP, 2002). Peters, Vance and Harsdorff (2011) found that firms which rely on electricity, established following electrification, have better market access because they offer new products and sell semi-finished products to other enterprises. They also have the potential outcompete firms that already existed. The numbers of enterprises may be positively correlated, causality is unproven. Pre-existing economic conditions are clearly important to the impact of electricity access, and the prioritisation of economically dynamic areas for electrification can bias survey results (Attigah and Mayer-Tasch, 2013).

Peters el al. (2011), investigating the performance of micro manufacturing firms in grid and non-grid coverage villages in Benin, found that although beneficial impacts from firm creation following electrification occur, firms that existed beforehand perform no better than their matched counterparts in non-electrified regions. Neelsen and Peters (2013) found that the average total resale value of a firm's capital stock does not differ between access and non-access areas, although access to the grid does lead to a shift in the composition of capital stock towards more electricity using machinery and equipment. Decisions by SMEs to connect to energy supply when it becomes available and their consumption of energy supply are influenced by the costs involved. Neelsen and Peters (2013) use the example of a carpenter in Uganda to show that the marginal returns to connection are often deemed to be off-set by the high cost of connecting, which are out of proportion to the perceived short and medium terms benefits.

In contrast, a foreign-owned small export enterprise planning to scale quickly to medium-sized enterprise saw electricity as crucial and readily invested in a connection and backup systems (Neelsen and Peters, 2013). However, firms which are not reliant on electricity can decide to invest in grid access without proper assessment of the costs and benefits, and face an 'electrification trap' when they overestimate the profitability of a connection on the premise that electricity is a prerequisite to modernisation (Peters et al., 2011).

Abeberese (2012), uses data on Indian manufacturing firms to show that in response to an exogenous increase in electricity price, firms reduce their electricity consumption and switch to industries with less electricity-intensive production processes, meaning that electricity constraints may lead firms to operate in industries with fewer productivity-enhancing opportunities. Similarly, in Nigeria, on average, obtaining an electricity connection takes more than 8 months and costs the equivalent of more than 10 times income per capita (World Bank, 2010).

There is some evidence to suggest that manufacturing SMEs may perceive smaller gains from electricity than service sector firms. In Uganda, Neelsen and Peters (2013) found that manufacturing firms were less inclined to connect to the grid or use decentralised electricity than service firms, because of the high investment costs of electric machinery coupled with sharp competition in the market for manufactured goods. The author has observed that several studies have examined the causal relationship between energy sector and business development using a production framework. It was observed from the literature that researches mostly were based on bi-variate causality model with energy consumption as the only input. This work will include additional variables in order to accommodate changes that are frequently countered by the substitution of other factors of production resulting in an insignificant overall impact on output.

This review of the empirical and theoretical literature associated with the energy sector revealed the following:

a. that energy sector have a significant relationship on business development and the authors are: Steiner, 2001, Jamasb, 2004, Kaseke et al, 2013, Penrose, 1993, Bihemo, 2010, Attigah et al, 2013, Lemma et al, 2016 , Peters et al 2011, among others.
b. Some of the previous studies looked at the energy sector without considering its effects/contributions to business development of South Eastern Zone of Nigeria. In addition to this, some had not examined the energy supply implications to Small and Medium Business Enterprises (SMEs).
c. From the aforementioned studies, very few studies have been undertaken to examine the effect of the energy sector and business development of South Eastern Zone of Nigeria. Many have not investigated its effects on the SMEs,

and the costs of the inadequacies impose on the manufacturing and industrial sub-sectors of the economy up to date (1990 -2016).

To this end, the study intends to fill the identified gap by coming out with very clear results that are devoid of conflicts by specifying time lagged variables, models and country. The previous research work needs to be updated using current data, therefore the need to fill the gap both in time frame and model used.

2.4 Summary of Empirical Submissions

Rud (2012), underscored energy infrastructure and consumption to be positive to productivity, business development and economic growth; Adenikinju (2005) and Isaksson (2010) also supported this assertion in their research. Olaniyan (2010), stated that energy consumption does not cause economic growth, while Subair and Oke (2008), did not state the statistical tool used in their study on the relationship between energy supply and economic development.

Kaseke and Hosking (2013), in their research on the relationship between energy consumption and Gross Domestic Product, found that energy generation positively related to labour, productivity, and total factor of production in South Africa. Using panel data from 1970 – 2000 and a range of 19 infrastructure measures. The study did not recommend the way forward.

Fisher, Gutierrez and Serra (2003) studied the effect of the energy sector reform of the economy of Chile on efficiency of businesses in an economy between 1985 and 1989. The result of the research showed that unit cost of production declined, labour productivity increased. The study indicated also that energy reforms helped to improve efficiency of businesses and social being of the people of Chile. The submission was not supported with statistical evidence.

Moyo (2012) and Akuru et al (2011) studied on the impact of power disruptions on firm productivity in the manufacturing sector in Nigeria, indicating that power outages variables have a negative and significant effect on productivity. The study was based on the survey datasets. Erbaykal (2008), on the effect of electricity on economic growth, using time series data for periods of 1970 – 2008 in Turkey; while employing Bounds test method. He disclosed that electricity has positive effect on the economic growth. His study neither recommended nor concluded the assertions. Fariddula (2011 and Magazzion (2011) in Malaysia revealed that energy is significant to growth in industrial and manufacturing and all productive sectors of the economy. While in India, a study undertook by Mallick (2007) discovered that coal consumption has positive influence on the industrial growth of India.

Ukpong (2009) in his study on power consumption in Nigeria, using a simple regression analysis, stated that there is a positive relationship between power consumption and industrialization which is important for accelerated growth and performance of the economy. Akinlo (2008) was for 11 sub-Saharan African countries from 1980 to 2003, Apergis and Payne (2009) for 9 South American countries 1980 – 2004. Ozturk, Aslan and Kalyoncuc (2010) for low and middle income countries from 1971 to 2005.

Jamash, (2004), researched on the impact of energy reform on the performance of Nigeria. The author applied standard structure-conduct-performance model to test the effect of market structure, reform measures on economic performance and institutional factors. The three types of determinants had been tested and a range of variables had also been used to represent sector reforms, market structure and institutional factors. Jamasb, (2004) used data on privatization of electricity in Nigeria and observed that the power reform led to higher capacity utilization and lower prices under the unbundling of the sector.

Some scholars' work associated themselves with roles energy sector plays in stimulating micro-enterprises; and most of the literatures that emanates from the results of South African Small and Medium Enterprises (SMEs) as revealed by

Prasad and Dieden (2009) Philipines (ESMAP, 2002). The studies had unclear submissions. However, most of the literatures seem to agree that energy sector restructure has positive influence on the manufacturing, and industrial sub-sectors of the economy.

Technology had a great effect in all aspects of life and the global economy is currently undergoing fundamental transformation. Technology has huge effect in most industries and in all aspects of the economy, while businesses and enterprises continue to undergo considerable changes. According to Namani (2009), study on the role of technology in small and medium sized enterprises in Kosova. He reveals that modern (as obtainable in South Eastern Zone of Nigeria) businesses are not possible without help of modern technology and information which he stated have significant effect and relationship on the operations of SMEs; and opined that it is essential for the survival and growth of businesses in general.

2.5 Small and Medium Businesses in South Eastern Zone of Nigeria,

Small and medium businesses are responsible for most of the advances in new products and process; they provide most of the employment opportunities. They also form key indicator(s) of the overall performance of businesses in an economy. Employment band was used to classify SMEs. SMEs are those enterprises that engage between 1-10 persons, this is by National definition. Alternatively, using tax turnover definition of SMEs – are those enterprises that pay between five hundred thousand (N500,000.00) Naira as tax downwards. The lean nature and size of the sectors underscore their vulnerability to sudden change in government policy direction. The provision of regular and affordable electricity supply to this sector becomes essential for unlocking the key potentials of businesses in the economy. The under-matrixed tables (2.2 – 2.9) represent various activities of the sector.

Table 2.2: Number of Small and Medium Enterprise on Basis of Activity

BUSINESS SECTOR	2013 Small (No of Enterprise)	2013 Medium (No of Enterprise)	2013 TOTAL	2010 Small (No of Enterprise)	2010 Medium (No of Enterprise)	2010 TOTAL	Change	% Change
Manufacturing	13,109	528	13,637	696	54	750	12,887	25.96
Mining & Quarrying	213	32	245	134	33	167	78	0.16
Accommodation & Food Services	6,953	155	7,108	5,939	713	6,652	456	0.92
Agriculture	1,389	146	1,536	194	45	239	1,297	2.61
Wholesale/ Retail Trade	14,870	249	15,119	3,916	125	4,041	11,078	22.32
Construction	487	65	552	2,088	121	2,209	(1,657)	(3.34)
Transport & Storage	800	39	838	680	131	811	28	0.06
Information And Communication	437	30	467	2,166	158	2,323	(1,856)	(3.74)
Education	24,034	3,250	27,284	908	52	960	26,324	53.03
Administrative & Support Activities	2,883	99	2,982	1,508	101	1,608	1,374	2.77
Arts, Entertainment & Recreation	245	15	260	2,542	113	2,654	(2,394)	(4.82)
Others Services Activities	2,724	62	2,785	495	10	505	2,280	4.59
Water Supply, Sewerage, Waste Management And Remediation Act	23	1	24	280	5	285	(261)	(0.53)
TOTAL	**68,168**	**4,670**	**72,839**	**21,264**	**1,654**	**22,918**	**49636**	**100.00**

***Source:** *National Bureau of Statistics (2015) and Researcher's Computation (2017)*

The number of small and medium enterprise by state on basis of the activity – Education sector in 2013 with 27,284 compared to 960 in 2010 with difference of 26,324 while Accommodation and Food services had the highest number of enterprise in 2010. Out of which 6,652 witnessed a growth rate of 0.92 per cent with 7,108 enterprises in 2013.

A decrease of 2,394 enterprises indicated a percentage decrease of -4.82 per cent was experienced in the Arts, Entertainment and Recreation Sector. While the construction, information and communication witnessed decreases of 1,657 and 1,856 from 2,209 and 2,323 respectively in 2010 and 2013.

Table 2.3: Number of Small and Medium Enterprise by State 2013 and 2010

STATE	2013 Small (No of Enterprise)	2013 Medium (No of Enterprise)	TOTAL	2010 Small (No of Enterprise)	2010 Medium (No of Enterprise)	TOTAL	Change	% Change
Abia	1,769	40	1809	526	7	534	1275	2.55
Adamawa				235	11	245	(245)	(0.49)
Akwa Ibom	898	195	1092	275	39	315	777	1.56
Anambra	1,620	117	1737	656	81	737	1000	2.00
Bauchi	2,039	27	2066	497	49	545	1520	3.05
Bayelsa	354	72	426	134	-	134	292	0.59
Benue	1,146	72	1167	357	16	374	794	1.59
Borno		22		131	37	168	(168)	(0.34)
Cross river	1,126	168	1294	318	47	365	928	1.86
Delta	1,444	-	1444	576	33	605	836	1.67
Ebonyi	1206	4	1210	232	12	244	966	1.93
Edo	1879	118	1997	899	29	929	1068	2.14
Ekiti	903	126	1030	280	5	285	745	1.49
Enugu	812	99	911	402	30	432	479	0.96
Gombe	1043	65	1108	225	31	255	852	1.71
Imo	1259	135	1394	534	40	574	819	1.64
Jigawa	1022	75	1097	217	14	231	866	1.73
Kaduna	2712	170	2882	1137	145	1282	1600	3.20
Kano	7790	496	8286	1740	69	1808	6478	12.98
Katsina	1256	99	1355	464	70	535	820	1.64
Kebbi	898	91	989	221	11	232	756	1.52
Kogi	827	17	844	328	11	340	504	1.01
Kwara	164	62	226	415	28	443	(217)	(0.43)
Lagos	11044	619	11663	4146	389	4535	7128	14.28
Nasarawa	1098	22	1120	387	32	408	702	1.41
Niger	1258	100	1357	433	46	478	879	1.76
Ogun	1690	104	1794	506	40	546	1248	2.50
Ondo	1805	194	1999	596	18	614	1385	2.77
Osun	2247	25	2273	100	-	100	2172	4.35
Oyo	7468	519	7987	1300	94	1394	6598	13.21
Plateau	2070	110	2180	613	49	663	1517	3.04
Rivers	2981	41	3022	662	60	723	2299	4.61
Sokoto	631	210	841	562	19	581	259	0.52
Taraba	891	69	960	242	5	247	713	1.43
Yobe				150	5	156	(156)	(0.31)
Zamfara	577	16	593	341	-	341	252	0.51
FCT	2244	446	2690	427	80	507	2183	4.37
Total	**68,168**	**4,670**	**72,839**	**21,264**	**1,654**	**22,918**	**49,921**	**100.00**

***Source:** *National Bureau of Statistics (2015), National MSME Survey Report 2013*

Table 2.3, above indicated that Lagos State had the highest number in Enterprises between 2010 and 2013 ranging from 4,535 to 11,663; showing an increase of 7,128 with a percentage change of 157.18 per cent. This is followed by Oyo State with 1,394 enterprise in 2010 increased to 7,989 in 2013 with an increase of 6,593, while the least state with increase in enterprise is Zamfara State with 341 enterprise in 2010 increased to 593 in 2013 with a difference of 252 and percentage change of 73.90 per cent.

Apart from the insurgent prone states of Adamawa, Borno and Yobe States that the survey was not conducted in 2013, Kwara State experienced a decrease in enterprise from 443 in 2010 to 226 in 2013 which shows a decreased by 217 enterprises or – 48.98 percent.

FCT witnessed increase in enterprise from 507 in 2010 to 2,690 in 2013 signifying an increase of 2,183 with a relative 430.57 per cent increase.

Table 2.4: Number of Small and Medium Enterprise in Eastern Zone 2013 and 2010

STATE	2013 Small (No of Enterprise)	2013 Medium (No of Enterprise)	TOTAL	2010 Small (No of Enterprise)	2010 Medium (No of Enterprise)	TOTAL	Change	% Change
Abia	1,769	40	1809	526	7	534	1275	2.55
Anambra	1,620	117	1737	656	81	737	1000	2.00
Ebonyi	1206	4	1210	232	12	244	966	1.93
Enugu	812	99	911	402	30	432	479	0.96
Imo	1259	135	1394	534	40	574	819	1.64
Total	**6,666**	**395**	**7,061**	**2,350**	**170**	**2,521**	**4,539**	**9.08**

***Source:** *National Bureau of Statistics (2015) and Researcher's Computation (2017)*

Table 2.5: Small and Medium Firm by sector on basis of Activity 2013 and 2010

Business sector	2013 10-49 Small (No of Enterprise)	2013 50-199 Medium (No of Enterprise)	Total	2010 10-49 Small (No of Enterprise)	2010 50-199 Medium (No of Enterprise)	Total	Change	% Change
Manufacturing	13, 109	528	13,637	696	54	750	12,887	25.96
Mining & Quarrying	213	32	245	134	33	167	78	0.16
Accommodation & Food Services	6,953	155	7,108	5,939	713	6,652	456	0.92
Agriculture	1,389	146	1,536	194	45	239	1,297	2.61
Wholesale/Retail trade	14,870	249	15,119	3,916	125	4,041	11,078	22.32
Construction	487	65	552	2,088	121	2,209	(1,657)	(3.34)
Transport & Storage	800	39	838	680	131	811	28	0.06
Information & Communication	437	30	467	2,166	158	2,323	(1,856)	(3.74)
Education	24,034	3,250	**27,284**	908	52	**960**	26,324	53.03
Administration & Communication	2,883	99	2, 982	1,508	101	1,608	1,374	2.77
Art, Entertainment and Recreation	245	15	260	2,542	113	2,654	(2,394)	(4.52)
Others Services Activities	2,724	62	2,785	495	10	505	2,280	4.59
Water Supply, Sewerage, Waste Management and Remediation Act	23	1	24	280	5	285	(261)	(0.5)
Total	**68,168**	**4,670**	**72,839**	**21,264**	**1,654**	**22,918**	**49,636**	**100.00**

***Source:** *National Bureau of Statistics (2015), National MSME Survey Report 2013*

Table 2.5: indicated that the Education sector has the highest number of enterprises in 2013 with 27,284 compared to 960 in 2010 with a difference of 26,324 while Accommodation and Food Services had the highest number of enterprise in 2010 out

of which 6,652 witnessed a growth rate of 0.92 per cent with 7,108 enterprises in 2013. A decrease of 2,394 enterprises indicating a percentage decrease of -4.82 percent in the Arts, Entertainment and Recreation sector. While the construction and information and Communication witnessed decreases of 1,657 and 1,856 from 2,209 and 2,323 respectively in 2010 and 2013.

Table 2.6: Classification of the Small and Medium Enterprise in Nigeria

State	Small (10-49) *Number of Enterprises*	*Percentage*	Medium (50-199) *Number of Enterprises*	*Percentage*	Total
Abia	1,769	97,078	40	2	1,809
Akwa-Ibom	898	82	195	18	1,092
Anambra	1,620	93	117	7	1,737
Bauchi	2,039	99	27	1	2,066
Bayelsa	354	83	72	17	426
Benue	1,146	98	22	2	1,167
Cross river	1,126	87	168	13	1,294
Delta	1,444	100	-	-	1,444
Ebonyi	1,206	100	4	0	1,210
Edo	1,879	94	118	6	1,997
Ekiti	903	88	126	12	1,030
Enugu	812	89	99	11	911
Gombe	1,043	94	65	6	1,108
Imo	1,259	90	135	10	1,394
Jigawa	1,022	93	75	7	1,097
Kaduna	2,712	97	170	3	2,882
Kano	7,790	97	496	3	8,286
Katsina	1,256	93	99	7	1,355
Kebbi	898	91	91	9	989
Kogi	827	98	17	2	844
Kwara	164	73	62	27	226
Lagos	11,044	96	619	4	11,663
Nasarawa	1,098	98	22	2	1,120
Niger	1,258	93	100	7	1,357
Ogun	1,690	94	104	6	1,794
Ondo	1,805	90	194	10	1,999
Osun	2,247	99	25	1	2,273
Oyo	7,468	95	519	5	7,987
Plateau	2,070	95	110	5	2,180
Rivers	2,981	99	41	1	3,022
Sokoto	631	75	210	25	841
Taraba	891	93	69	7	960
Zamfara	577	95	16	5	593
FCT	2,244	83	210	17	2,690
Total	**68,168**	94	4,670	6	**72,839**

Source: *National MSME Survey Report 2013, National Bureau of Statistics (2015)*

From Table 2.6: A total number of 72,839 Small and Medium Enterprises exist in Nigeria, out of which 68,168 (94 per cent) Enterprises are small which employed between 10-49 persons and 4,671 (6 per cent) Enterprises are Medium with employment size between 50-199 persons. This shows that majority of the enterprises in Nigeria are small enterprises, Lagos State has majority of enterprises, followed by Kano State, while Kwara State has the least.

Table 2.7: Classification of the Small and Medium Enterprise in Eastern Zone

State	**Small (10-49)**		**Medium (50-199)**		**Total**
	Number of Enterprises	Percentage	Number of Enterprises	Percentage	
Abia	1,769	97,078	40	2	1,809
Anambra	1,620	93	117	7	1,737
Ebonyi	1,206	100	4	0	1,210
Enugu	812	89	99	11	911
Imo	1,259	90	135	10	1,394
Total	**6,666**	97,450	395	30	**7061**

***Source**: National MSME Survey Report 2013, National Bureau of Statistics (2015)*

Table 2.8: Registered Small and Medium Enterprises in Nigeria on Basis of Zones

S/N	Zones	State	Small		Medium		Total
			No. of formal Enterprise	Percentage	No. of Formal Enterprise	Percentage	
1	***South-East***	Abia	1,769	97,078	40	2	1,809
		Anambra	1,620	93	117	7	1,737
		Ebonyi	1,206	100	4	0	1,210
		Enugu	812	89	99	11	911
		Imo	1,259	90	135	10	1,394
		Sub-Total	***6,666***	***97,450***	***395***	***30***	***7,061***
2	*South-South*	A/Ibom	898	82	195	18	1,092
		Bayelsa	354	83	72	17	426
		C/River	1,126	87	168	13	1,294
		Delta	1,444	100	-		1,444
		Edo	1,879	94	118	6	1,997
		Rivers	2,981	99	41	1	3,022
		Sub-Total	***8682***	***545***	***594***	***55***	***9,275***
3	*South-West*	Ekiti	1,620	93	117	7	1,737
		Lagos	11,044	96	619	4	11,663
		Ogun	1,690	94	104	6	1,794
		Ondo	1,805	90	194	10	1,999
		Osun	2,247	99	25	1	2,273
		Oyo	7,468	95	519	5	7,987
		Sub-Total	***25,874***	***567***	***1,578***	***33***	***27,453***
4	*North East*	Taraba	891	93	69	7	960
		Bauchi	2,039	99	27	1	2,066
		Gombe	1,043	94	65	6	1,108
		Sub-Total	***3973***	***286***	***161***	***14***	**4134**
5	*North Central*	Benue	1,146	98	22	2	1,167
		Kogi	827	98	17	2	844
		Kwara	164	73	62	27	226
		Nasarawa	1,098	98	22	2	1,120
		Niger	1,258	93	100	7	1,357
		Plateau	2,070	95	110	5	2,180
		FCT	2,244	83	446	17	2,690
		Sub-Total	***8,807***	***638***	***779***	***62***	***9,584***
6	*North West*	Katsina	1,256	93	99	7	1,355
		Jigawa	1,022	93	75	7	1,097
		Kaduna	2,712	97	170	3	2,882
		Kano	7,790	97	496	3	8,286
		Kebbi	898	91	91	9	989
		Sokoto	631	75	210	25	841
		Zamfara	577	95	16	5	593
		Sub-Total	***14,886***	***641***	***1,157***	***59***	***16,043***
		Total	**68,888**	**1**	**4,670**	**6**	**72,839**

Source*:* *National MSME survey report 2013, National Bureau of Statistics (2015)*

From the table 2.8 above, a total of 72,839 Small and Medium Enterprise exist in Nigeria. Out of which 68,168 (94 per cent) Enterprises are small which employ between 10-49 persons and 4,671 (6 per cent) Enterprises are Medium with employment size between 50-199 persons. This shows that majority of the Enterprises in Nigeria are small Enterprises. Lagos State has the majority of Enterprises, followed by Kano State while Kwara State has the least.

Table 2.9: **Daily Usage of Alternative Source of Energy by Sector**

Business Sector	1-5 Hours		6-10 Hours		11-15 Hours		16-20 Hours		Above 20 Hours		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Manufacturing	4,388	3833	3,863	33.75	1,604	14.01	821	7.17	771	6.74	11,446
Mining & Quarrying	63	24.07	117	44.81	39	14.94	37	14.11	5	2.07	260
Accommodation & Food Services	1,897	24.13	2,295	29.18	1,627	20.69	1,129	14.35	916	11.65	7,864
Agriculture	735	47.26	402	25.82	261	16.79	49	3.12	109	7.01	1,556
Wholesale/retail Trade	7,675	49.02	3,866	24.70	2,080	13.29	646	4.13	1,387	0.86	15,651
Construction	226	41.06	198	35.95	44	8.06	52	9.43	30	5.50	550
Transport & Storage	437	52.39	147	17.59	147	17.59	44	5.30	59	7.12	835
Information & Communication	170	35.20	154	32.06	78	16.14	39	8.07	41	8.52	482
Education	15,513	57.36	7,557	27.94	1,575	5.82	1,123	4.15	1,278	4.72	27,046
Administration & Communication	1,552	48.30	1,013	31.53	347	10.79	100	3.13	201	6.25	3,213
Art, Entertainment & Recreation	131	46.36	83	29.50	31	11.11	8	2.68	29	10.34	282
Others services Activities	1,605	44.20	1,240	34.15	296	8.15	262	7.23	228	6.28	3,631
Water Supply, Sewerage, Waste Management and Remediation Act	10	4.091	4	1818	3	13.64	4	18.18	2	9.09	24
Total	**34,399**	**47.23**	**20,939**	**28.75**	**8,132**	**11.16**	**4,313**	**5.92**	**5,056**	**6.94**	**72,839**

Source: National MSME survey report 2013, NBS (2015)

Table 2.9, provides information on the daily usage of alternative source of power by business sector in which Administrative and support activities sector with 48.30 per cent mostly made use of alternative source of power between 1 to 5 hours. Whereas, mining and quarrying business sector recorded the lowest consumption on daily alternative source of power with 24.07 per cent. It also observed that Water Supply, Sewerage, Waste Management and Remediation business sector with 18.8 per cent mostly made use of alternative source of power between 16-20 hours daily while Agriculture sector recorded the lowest percentage of 3.12 per cent on daily usage of alternative source of power between 16-20 hours. The table also indicated that Accommodation and Food services business sector used above 20 hours of

Alternative source of power daily with 11.65 per cent as the highest. The lowest is recorded in mining and quarry business sector with 2.07 per cent.

2.6 Gaps in Literature

The gaps in the literature reviewed that motivated this study are hereunder highlighted. Several studies have been done on the Energy sector. Olaniyan (2010) studied the impact of the energy reforms in Gambia and Burkina Faso; Subair, and Oke (2008) studied on the relationship between energy supply and economic development of Lesotho, Benin Republic and Nigeria; Kaseke and Hosking (2013) studied on the relationship between energy consumption and Gross Domestic Product and the total factor productivity in South Africa; Akinlo (2008) studied energy sector on the relationship between consumption, economic and industrial growth in Gambia, Cameroun, Ghana, Cote d'Ivoire, Senegal, Zimbabwe and Sudan. Fisher, Gutierrez and Serra (2003) studied the effect of the energy sector reform of the economy of Chile; Moyo (2012) studied on the impact of power disruptions on firm productivity in the manufacturing sector in Nigeria; Cisssokho and Seck (2013) studied the influence of inadequate supply of electricity on SMEs overall costs in Senegal, among others. None of these researches was done with a view to assess the energy sector and business development with emphasis on South Eastern Zone of Nigeria. Most of the researches had been looking at reforms, very few studies had been researched on Nigeria and none have examined the influence/relationship of the energy sector on the business development of the study area. The previous studies had not been up to date. These are the gap in this research.

CHAPTER THREE
METHODOLOGY

3.1 Research Design

Research Design is a blueprint that guides data collection, measurement and analysis. It encompasses the methods and methodology employed to conduct scientific research. The research design adopted for this study is the *ex post facto* design being a suitable technique for time order assessment of variables using time series data from the periods 1990 – 2016 on the energy sector and business development of south eastern zone of Nigeria. Moreover, the suitability of this choice was based on the fact that the design allows researchers to establish the time sequence of the variables on the basis of logical considerations. This is appropriate for a developing economy like Nigeria, and also, it is adequate enough to validly capture any behavioural change. Furthermore, the expected availability of data contributed to the choice of this period.

3.2 Sources of Data

The study used Primary data (collected through the use of administered questionnaire) and Secondary data sourced from the Central Bank of Nigeria (CBN) statistical bulletin, National Bureau of Statistics (NBS) publications, National MSME survey report 2013 of SMEDAN, Federal Ministry Power, Nigerian Electricity Regulatory Commission (NERC), and Power Holding Company of Nigeria (PHCN), and some online resources and publications.

3.3 Data Required

The following data are required for analysis for the periods (1990 – 2016) years. These are.

Data on Manufacturing for 27 years

Data on Technology for 27 years

Data on Capacity utilization for 27 years

Data on Exchange rate for 27 years

Data on Import for 27 years

Data on Investment for 27 years

Data on Industrial Production for 27 years

Data on Gross Domestic Product (GDP) for 27 years

Data on Export assets for 27 years

Data on Balance of Payment for 27 years

Data on Energy supply for 27 years

Data on labour for 27 years

3.4 Population of the Study

The population and sample size of the Objective 4 (questionnaire) which is to examine the extent to which the use of obsolete Electricity generation Equipment affect Business Development of South Eastern Zone of Nigeria with particular reference to Small and Medium Enterprises (SMEs). The target population for the objective four (4) of the study was the entire five (5) Eastern States namely: Anambra, Abia, Enugu, Ebonyi and Imo states that made up south eastern states of the country. Based on the survey conducted by National Bureau of Statistics put the population of SMEs in the South East to be one thousand, eight hundred and eighty four (1,884) businesses across the five (5) States of the South East zone. Because of the heterogeneity of the population, individual businesses typically have widely varying probabilities of selection, depending on the stratum into which they fall. The weights used for 'grossing-up' the sample values, in the simplest form of estimation, should be proportional to the inverse of their probability of selection (the Horvitz-Thompson or π-estimator).

3.5 Sample Size and Techniques

According to Yamani (1964) to determine sample size from a finite population, the following is applicable.

$$n = \frac{N}{1 + N(e)^2}$$

where,

n	=	*Sample Size*	=	*?*
N	=	*Population Size*	=	*1884*
e	=	*error margin*	=	*5 % or 0.05*

Therefore substituting the population figure into this formula using 5% margin of error we have:

$$n = \frac{1884}{1 + 1884(0.05)^2}$$

$$n = \frac{1884}{1 + 1884(0.0025)}$$

$$n = \frac{1884}{1 + 1884(0.0025)}$$

$$n = \frac{1884}{1 + 4.7}$$

$$n = \frac{1884}{5.71}$$

$$n = 329.95 \approx 330$$

3.6 Sample Size Allocation Schedule

Having determined the sample size (n), the next problem that faced the researcher was how to determine the proportion of each of the sector with probability proportion to size of employment in the activity sector that should be included in the sample size (n). On this note, the researcher applied statistical tool using Bowley's proportional allocation formula (Kurmar, 1976) thus;

$$n = N/1+N(e)^2$$

where

Nhj = *the Sample Size for each stratum and j ranges from 1, 2. ….n*

n = *total sample size*

^{n}hj = *the population sample size of each stratum*

N = *the total population*

Table 3.1: Sample Size Allocation Schedule

Serial (a)	Business Sector (b)	Sample size (c)
1	Manufacturing	84
2	Mining & Quarrying	35
3	Accommodation & Food Service	34
4	Agriculture	28
5	Construction	24
6	Transport & Storage	34
7	Information & Communication	19
8	Education	16
9	Administrative & Support Services	12
10	Art. Entertainment & Recreation	10
11	Water Supply, Sewage, Waste Management & Remediation	8
12	Other Services	26
Total		**330**

***Source**: Fieldwork Survey Report, (2017)*

Therefore, the sampling distribution to each of the state is as follows; Anambra (70), Abia (70), Enugu (70), Ebonyi (50) and Imo (70) states based on the level of the economic activities of the respective states. A total of sample size of three hundred and thirty (330) questionnaires was lodged into five (5) states' economic activity sectors of south eastern zone of the country. The target sectors are namely; Manufacturing, Mining & Quarrying, Accommodation & Food Services, Agriculture, Construction, Transport & Storage, Information & Communication, Education, Administrative & Support Services, Art, Entertainment& Recreation, Water Supply, Sewage Waste management & Remediation.

3.7 Validity and Reliability of Research Instruments

Colin P. et al **(**2005) in their paper titled exploring reliability in academic assessment defined reliability as the degree to which an assessment tool produces stable and consistent results. They also stated that validity refers to how well a test measures what it is purported to measure. To ensure the validity and hence the reliability of the research instruments, care has been taken to eliminate factors that introduce bias such as ambiguous and leading questions, wrong respondent, questionnaire not properly completed nor returned, etc.

Shown below is the result of validity and reliability of research instruments test conducted in order to test the validity and reliability of the research instrument using Cronbach's Alpha in Special Package for Social Sciences (SPSS) 17.0.

Table 3.2: The Validity of the instrument in respect of objective 4

Cases		N
	Valid	1884
	Excludeda	0
	Total	1884
a. List wise deletion based on all variables in the procedure.		

Table 3.3: Reliability Test of the instrument

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.7160653	0.752716839	3

Cronbach's alpha is the most common measure of internal consistency ("reliability"). It was chosen due to the presence of multiple Likert questions in the questionnaire that form a scale and wished to determine if the scale is reliable. Cronbach's alpha simply provides us with an overall reliability coefficient for a set of variables and when individual reliability is to be checked, we use Principal Component Analysis.
As seen in **table 3.3 above,** the Cronbach's alpha is **0.7527**, which indicates a high level of internal consistency for our scale with this specific sampled of study.

3.8 Model Specification

In this section, models are developed for energy sector and business development of South Eastern Zone of Nigeria. The models are to measure and evaluate energy sector and business development. Specifically, the research aims at energy sector variables such as Manufacturing, Energy supply, Industrial Production, Capacity Utilization, Technology, Gross Domestic Product, and Labour. The objective of this section therefore, is to specify model that will aid the direction of the objectives. The Ordinary Least Square (OLS) technique is used to determine the equation, the OLS is adopted to obtain the direct relationship of variables measured and to guard against bias.

3.9 Model Estimation and Validity of Instrument in respect of objectives 1-3

The validity and reliability of the instrument were determined using ordinary least square (OLS) technique.

This technique is the best linear unbiased estimator. To test the validity of the model, the following statistical econometric tests were conducted.

(i) T-test refers to the estimated regression coefficient test. This will enable us ascertain the statistical reliability of the regression coefficient in the model specified and used in the study.

(ii) (R^2 coefficient).This represents the adjusted coefficient of determination and is adopted to determine fitness of the model.

(iii) F-test or F-ratio tests the overall significance of the regression.

(iv) Standard error test is used to test for statistical reliability of the coefficient estimates.

(v) Durbin Watson: This aid in examining the extent of serial correlation in the study.

The data used here in the study forms a combination of sectional and time series data relating to energy sector and business development indicators for the period under study.

3.9.1 Manufacturing equation:

This equation assesses the extent to which energy supply affect manufacturing sub-sector of south eastern zone of Nigeria.

The estimation model is as highlighted below:

$$\boldsymbol{MANU = f\,(ENE,\ INDP,\ CAPU,\ TECH,\ GDP,\ LAB)}\ e_t \qquad \textbf{(i)}$$

This can be restated as follows:

$$\boldsymbol{MANU} = a_{o+}a_1\ LENES + a_2 LINDP + a_3 LCAPU + a_4 LTECH, + a_5 LGDP + a_6 LLAB + \xi_t \qquad \textbf{(ii)}$$

where:

$\boldsymbol{\xi_t}$	=	*represents the stochastic term, Error*
$\boldsymbol{a_o – a_6}$	=	*represents parameter estimates/structures*
LMANU	=	*Log of Manufacturing*
LENE	=	*Log of Energy supply*
LINDP	=	*Log of ; Industrial Production*
LCAPU	=	*Log of Capacity Utilization*
LTECH	=	*Log of Technology*
LGDP	=	*Log of Gross Domestic Product*
LLAB	=	*Log of Labour*

Manufacturing refers to range of human activity from handicraft to high tech but it is most commonly applied to industrial production in which raw materials are transformed into finished goods on a large scale. It is also presented as dependent variable and has a functional relationship with energy supply, industrial production, capacity utilization, technology, gross domestic product and labour. A boost in manufacturing production offers prospects of a growing availability of manufactured products and increased employment. Energy supply is the delivery of transformed fuels to point of consumption. It potentially encompasses the extraction, transmission, generation, distribution and storage. This is required to keep economic activities going especially manufacturing and industrial sub-sector of the economy. Industrial production measures the physical volume of output of nation's manufacturing sector including factories and utilities, and this formed part of the key indicator. Hence electricity supply is an instrument of industrialization. Capacity utilization is the extent to which the productive capacity of a plant, organization is being used in generation of goods and services. The capacity utilization of electricity power plants in the South Eastern Zone has been very low that most rural communities are not connected to the national grid system and therefore lack the electricity-based infrastructures that would empower the establishment of social and industrial amenities. Technology is fixed asset and a long term tangible piece of property uses in the production of its income which is expected to be later converted into cash. It is also a process of transforming scientific discoveries into realities. Gross Domestic Product is a total market value of all final goods and services produced in a country during a given period of time. Labour form the aggregate of all human physical and mental effort used in creation of goods and services. Labour is a primary factor of production. The size of a nation's adult population and the extent to which the adults are either working or are prepared to offer their labour for wages is defined as labour.

3.9.2 Business Growth equation: The equation ascertains the influence of energy generation relative to installed capacity on business growth of south eastern zone:

$$GDP = f\,(ENES, MANU, INDP, IMP, EXP, CAPU, EXCHR, BOP) \quad (iii)$$

$$GDP = bo + b_1 LENES + b_2 LMANU + b_3 LINDP + b_4 LIMP + b_5 LEXP + b_6 CAPU + b_7 EXCHR + b_8 LBOP + \xi_t \quad (iv)$$

where:

$b_1 - b_2$	=	*Parameter estimates/structures*
e_t	=	*error term*
LGDP	=	*Log of Business Growth*
LENES	=	*Log of Energy Supply*
LMANU	=	*Log of Manufacturing*
LINDP	=	*Log of Industrial Production*
LIMP	=	*Log of Import*
LEXP	=	*Log of Export*
LCAPU	=	*Log of Capacity Utilization*
LEXCHR	=	*Log of Exchange Rate*
LBOP	=	*Log of Balance of Payment*

Gross Domestic Product is the total market value of all final goods and services produced within a nation's geographic borders over a period of time. Energy supply is the delivery of fuels or transformed fuels to point of consumption. It potentially encompasses the extraction, transmission, generation, distribution and storage. Manufacturing refers to range of human activity from handicraft to high tech but it is most commonly applied to industrial production in which raw materials are transformed into finished goods on a large scale. A boost in manufacturing production offers prospects of a growing availability of manufactured products and increased employment. Industrial Production measures the physical volume of output of nation's manufacturing sector including factories; it is a key economic indicator in macro economic analysis. Hence electricity supply is an instrument of industrialization. Import is goods/services brought into a jurisdiction, especially across a national border, from an external source for purpose of trade. Export refers to selling goods and services produced in the home country and exported at a particular point in time to another country. Capacity Utilization is the extent to which the productive capacity of a plant, firm or country is being used in generation of goods and services expressed usually in percentage. It is computed by dividing the total capacity with the portion being utilized. The capacity utilization is the extent to which the productive capacity of a plant of a plant or Country is being used in generation of goods and services. The capacity utilization of electricity power plants in the South Eastern Zone has been very low that most rural communities are not connected to the national grid system and therefore lack the electricity-based infrastructures that would empower the establishment of social and industrial amenities. Exchange rate is the current market price for which one currency can be exchanged for another. Balance of Payments (BOP**)** is the record of all economic transactions between the residents of the country and the rest of the world in a particular period (over a quarter of a year or more commonly over a year).

3.9.3 Industrial Production equation:

The equation determines the influence of gas supply on industrial production of south eastern zone of Nigeria.

INDP = $\quad$ ***f (ENES, CAPU, TECH, INVT, EXCHR, MANU)*** e_t $\qquad$ ***(v)***

INDP = $\quad$ $c_o + c_1 LENES + c_2 LCAPU + c_3 LTECH + c_4 LINVT + c_5 LECHR + c_6 LMANU$ $\qquad$ ***(vi)***

where:

$c_o - c_1$	=	*parameter estimates/parameter structures*
$_{ct}$	=	*stochastic error*
LINDP	=	*Log of Industrial Production*
Lc_1LENES	=	*Log of Energy supply*
Lc_2LCAPU	=	*Log of Capacity Utilization*
Lc_3LTECH	=	*Log of Technology*
Lc_4LINVT	=	*Log of Investment*
$Lc_5LEXCHR$	=	*Log of Exchange Rate*
Lc_6MANU	=	*Log of Manufacturing*

Industrial Production measures the physical volume of output of nation's manufacturing sector including factories; it is a key economic indicator in macro economic analysis. Hence electricity supply is an instrument of industrialization. Energy supply is the delivery of fuels or transformed fuels to point of consumption. It potentially encompasses the extraction, transmission, generation, distribution and storage. Capacity Utilization is the extent to which the productive capacity of a plant, firm or country is being used in generation of goods and services expressed usually in percentage. It is computed by dividing the total capacity with the portion being utilized. The capacity utilization of electricity power plants in the South Eastern Zone has been very low that most rural communities are not connected to the national grid system and therefore lack the electricity-based infrastructures that would empower the establishment of social and industrial amenities. Technology is the result of man's acquired knowledge, acquired skills on how to do things that is based on scientific and modern knowledge. It is also presented as a dependent variable and a functional relationship with manufacturing and industrial production.

Investment is an asset or item that is purchased with the hope that it will generate more income in future. It is also the investing of money in order to gain profitable return as interest, income or appreciation in value. Exchange rate is the current market price for which one currency can be exchanged for another. Manufacturing refers to range of human activity from handicraft to high tech but it is most commonly applied to industrial production in which raw materials are transformed into finished goods on a large scale. A boost in manufacturing production offers prospects of a growing availability of manufactured products and increased employment.

3.10 Summary of Complete Equations

Manufacturing

$$= a_0+a_1LENES+a_2 LINDP+a_3LCAPU+a_4 LTECH +a_5 LGDP+a_6LLAB+e_t \qquad (vii)$$

Business Growth

$$= bo+b_1LENES+b_2LMANU+b_3LINDP+b_4LIMP +b_5EXP + b_6LCAPU+b_7LEXCHR +b_7LBOP+e_t \qquad (viii)$$

Industrial Production

$$= c_o+c_1LENES+c_2LCAPU+c_3LTECH+c_4LINVT +c_5LECHR +c_6LMANU+e_t \qquad (ix)$$

3.10.1 Structure of Parameter Estimates of Complete Equations

a_0+a_6 = *Manufacturing equation*

b_0+b_7 = *Business Growth equation*

c_0+c_6 = *Industrial Production equation*

The table below shows the summary of variables employed in this study

Table 3.4: Summary of Variables

Variable Dependent	*Variable Label*	*Measurement*	*Source*	*Expected sign*
Manufacturing	***MANU***	*Human Activity (Handcraft to High Tech)*	Omeregbe, (2014), National Bureau of Statistics (2016), Anudu (2013).	
Business Growth	***GDP***	*total market value of all final goods and services produced*	Riaz, (1984), National Bureau of Statistics (2016), Hwang and Gum (1992) CBN Statistical Bulletin (2015).	
Industrial Production	***INDP***	*the physical volume of output of nation's manufacturing sector including factories and utilities*	Awosipe, (2003), National Bureau of Statistics (2016), CBN Statistical Bulletin (2015), PHCN, 2004.	
Independent				
Energy supply	***ENE***	*the delivery of transformed fuels to point of consumption*	Shuyun and Donghua, (2011); NBS (2016), NERC (2016), Chiejina (2012), CBN Statistical Bulletin (2015), Morimoto and Hope (2001).	**-**
Capacity Utilization	***CAPU***	*the extent to which the productive capacity of a plant, organization is being used in generation of goods and services*	Chukuezi, (2009), National Bureau of Statistics (2016), Steiner (2001), CBN Statistical Bulletin (2015), Jamasb, (2004).	**-**
Labour	***LAB***	*the aggregate of all human physical and mental effort used*	Awosipe, (2003). National Bureau of Statistics (2016), Dantama and Nasiru (2012), CBN Statistical Bulletin (2015), Fedderke and Bogetic (2006).	**+**
Technology	***TECH***	*fixed asset and a long term tangible piece of property uses in the production*	ERGP, (2017), CBN Statistical Bulletin (2015), NPC, (2009), National Bureau of Statistics (2016), Namani (2009).	**-**
Investment	***INVT***	*asset or item that is purchased with the hope that it will generate more income in future*	National Bureau of Statistics (2016), CBN Statistical Bulletin (2015),	**+**
Control				
Balance of Payment	***BOP***	*the record of all economic transactions between the residents of the country and the rest of the world*	National Bureau of Statistics (2016), CBN Statistical Bulletin (2015).	**-**
Exchange Rate	***EXCHR***	*current market price for which one currency can be exchanged for another*	National Bureau of Statistics (2016), CBN Statistical Bulletin (2015).	**+**
Export	***EXP***	*to selling goods and services produced in the home country to other country*	National Bureau of Statistics (2016), CBN Statistical Bulletin (2015).	**-**
Import	***IMP***	*goods/services brought into a jurisdiction, especially across a national boarder, from an external source*	Chukuezi, (2009), National Bureau of Statistics (2016), (Awosipe, 2003), CBN Statistical Bulletin (2015).	**-**

Source: Researcher's Compilation (2017)

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

This chapter highlights the process involved in analysing the essential information for the study in relation to the presentation and analysis of data for empirical investigation. The focus is to run Regression for objectives one to three and elicit information from the questionnaire administered in respect of objective four.

4.1 Data Presentation

Data in relation to the study are presented in the tables below. Dependent variables include: Manufacturing, Business Growth, Industrial Production, and Technology, while the explanatory variables are: energy supply, capacity utilization, labour, exchange rate, investment, fixed assets, Import, Export, and Balance of Payment.

Table 4.1.1 shows data used for determining the extent to which energy supply affect manufacturing sub-sector of south eastern zone of Nigeria. Column 1 of the table presents the yearly data for manufacturing. Column 2 shows the yearly figures for Gross Domestic Product. Column 3 indicates figures for energy supply. Column 4 presents the yearly data for capacity utilization, while Column 5 shows the yearly figures for technology. Column 6 and 7 present the yearly data for labour and Industrial Production respectively.

Table 4.1.2 presents the data for ascertaining the influence of energy generation relative to installed capacity on Business Growth of south eastern zone of Nigeria. The table also present the range of years which the study covers. Column 1 of the table presents the yearly data for Business Growth (GDP). Column 2 shows the yearly figures for manufacturing. Column 3 indicates the yearly figures for energy supply. Column 4 presents the yearly data for capacity utilization. Column 5 indicates the yearly figures for Import. Column 6 shows the yearly data for Export. Column 7 presents yearly figures for industrial production, while Column 8 presents yearly figures for Balance of Payment.

Table 4.1.3 presents the data for determining the influence of gas supply on the Industrial Production of south eastern zone of Nigeria. The table also present the range of years which the study covers. Column 1 of the table shows the yearly data for industrial production. Column 2 indicates the yearly figures for manufacturing. Column 3 shows the yearly figures for energy supply. Column 4 presents the yearly data for capacity utilization. Column 5 indicates the yearly figures for technology within the year. Column 6 presents the yearly data for exchange rate. Column 7 indicates yearly figures for investment, while Column 8 presents Fixed Assets.

Table 4.1.1: Manufacturing equation

MANU = f (ENE, INDP, CAPU, TECH, GDP, LAB) e_t ***(i)***

Year	Gross Domestic Product (N Billion)	Energy Supply (Power) (Megawatt per Hour)	Capacity Utilisation Rates (%)	Technology (Electricity to GDP) (N'Billion)	Labour (N'Million)	Industrial Production (1985=100)
1990	472.65	1536.9	40.3	8.87	16561.98	130.6
1991	545.67	1617.2	42.0	9.28	20845.48	138.8
1992	875.34	1693.4	38.1	10.35	18129.88	136.2
1993	1089.68	1655.8	37.2	10.50	16753.91	131.7
1994	1399.70	1772.9	30.4	11.28	14171.02	129.2
1995	2907.36	1810.1	29.3	11.10	13664.35	128.8
1996	4032.30	1854.2	32.5	11.34	13906.01	132.5
1997	4189.25	1839.8	30.4	11.27	14084.15	140.6
1998	3989.45	1724.9	32.4	10.54	14545.89	133.9
1999	4679.21	1859.8	34.6	10.68	14861.82	129.1
2000	6713.57	1738.3	36.1	10.89	15082.82	138.9
2001	6895.20	1689.9	42.7	12.38	8638.29	144.1
2002	7795.76	2237.3	54.9	12.38	8112.12	145.2
2003	9913.52	6180.0	56.5	15.92	7041.06	147.0
2004	11411.07	2763.6	55.7	16.47	62869.23	151.2
2005	14610.88	2779.3	54.8	18.25	39940.32	158.8
2006	18564.59	3907.6	53.3	19.44	44243.71	152.3
2007	20657.32	3150.2	54.6	20.34	49017.75	154.1
2008	24296.33	3279.0	54.2	21.30	44400.59	155.1
2009	24794.24	3445.6	54.0	22.04	45887.35	153.8
2010	54612.26	3291.6	54.3	22.68	46435.23	154.3
2011	62980.40	3338.8	54.2	23.35	45574.39	154.4
2012	71713.94	3358.7	54.2	24.02	45965.66	154.2
2013	80092.56	3329.7	54.2	24.78	45991.76	154.3
2014	89043.62	3342.4	54.2	25.58	45843.94	154.3
2015	94144.96	3343.6	54.2	-	45933.79	154.3
***2016**	91594.26	3343	54.2	12.79	45888.9	154.3

Sources: *CBN Statistical Bulletin, CBN Annual Abstract, NBS (2016), Nigerian Electricity Regulatory Commission (NERC), Federal Ministry of Power*

Key:

LENE = *log of Energy supply*
LINDP = *log of Industrial Production*
LCAPU = *log of Capacity Utilization*
LTECH = *log of Technology*
LGDP = *log of Gross Domestic Product*
LLAB = *log of Labour*

Table 4.1.2: Business Growth (GDP)

GDP=f (ENES, MANU, INDP, IMP, EXP, CAPU, BOP, EXCHR) *(iii)*

Year	Manu. (1990= 100)	Energy Supply (Power) (MW per Hour)	Capacity Utilisation Rates (%)	Import (₦Million)	Export (₦million)	Industrial Prod (1985 =100)	BOP (₦million)	EXCHR (₦ per unit of foreign currency)
1990	100.0	1536.9	40.3	45717.9	109886	130.6	18498.2	131
1991	109.3	1617.2	42.0	89488.2	121535	138.8	5959.6	131
1992	112.2	1693.4	38.1	143151.2	205612	136.2	-65271.8	131
1993	89.3	1655.8	37.2	165629.4	218770	131.7	-95271.8	131
1994	88.5	1772.9	30.4	162788.8	206059	129.2	-42623.3	131
1995	83.7	1810.1	29.3	755127.7	950661	128.8	-195316.3	131
1996	85.1	1854.2	32.5	562626.6	1309543	132.5	-53152.0	131
1997	85.0	1839.8	30.4	845716.6	1241663	140.6	1076.3	131
1998	81.7	1724.9	32.4	837418.7	751859	133.9	-220675.1	131
1999	84.5	1859.8	34.6	862515.7	1188960	129.1	-32664.3	131
2000	84.8	1738.3	36.1	985022.4	1945723	138.9	314139.2	131
2001	84.5	1689.9	42.7	1358180.3	186794	144.1	24738.7	131
2002	89.8	2237.3	54.9	1512695.3	1744178	145.2	-563483.9	131
2003	90.3	6180.0	56.5	2080235.3	3087886	147.0	-162298.4	130
2004	89.4	2763.6	55.7	1987045.3	4602782	151.2	1124157.2	133
2005	89.4	2779.3	54.8	2800856.3	7246535	158.8	-1473537.1	130
2006	88.1	3907.6	53.3	3108519.3	7324681	152.3	-2406340.6	128.29
2007	89.0	3150.2	54.6	3911952.6	8309758	154.1	-2379064.66	121
2008	88.8	3279.0	54.2	5238195.2	10114738	155.1	-4314504.58	127
2009	88.6	3445.6	54.0	5116459.7	8402151	153.8	-3927487.97	150.85
2010	88.8	3291.6	54.3	7614656.2	11542024	154.3	-2470728.58	150.85
2011	88.8	3338.8	54.2	10235174.2	14240232	154.4	-1099997.48	155.71
2012	88.7	3358.7	54.2	9109032.5	15002868	154.2	-1242324.17	157.31
2013	88.8	3329.7	54.2	9672103.4	14621550	154.3	-117116083	157.9
2014	88.7	3342.4	54.2	9390568	14812209	154.3	-1206742.5	157.6
2015	88.7	3343.6	54.2	9531336	14716880	154.3	-59161412.8	157.8
***2016**	88.7	3343.0	54.2	9460951.5	14764544.3	154.3	-30184077.7	157.7

Sources: *CBN Statistical Bulletin, CBN Annual Abstract, NBS (2016), Nigerian Electricity Regulatory Commission (NERC), Federal Ministry of Power*

Key:

LENES	=	*Log of Energy Supply*
LMANU	=	*Log of Manufacturing*
LINDP	=	*Log of Industrial Production*
LIMP	=	*Log of Import*
LEXP	=	*Log of Export*
LCAPU	=	*Log of Capacity Utilization*
LBOP	=	*Log of Balance of Payment*
LEXCHR	=	*Log of Exchange*

Table 4.1.3: Industrial Production

INDP = f (MANU, ENES, CAPU, TECH, INVT, EXCHR, FAST,) ***(v)***

Year	Manufac-turing (1990=100)	Energy Supply (Pow) (MW per Hour)	Capacity Utilisation Rates (%)	Technology (Elec. to GDP) (N'Billion)	Exchange Rate (N/US$1.00)	Investment (N' Million)	Fixed Assets (N'Million)
1990	100.0	1536.9	40.3	8.87	8.04	10067.8	40,121.31
1991	109.3	1617.2	42.0	9.28	9.91	7453.5	45,190.23
1992	112.2	1693.4	38.1	10.35	17.30	6767.0	70,809.16
1993	89.3	1655.8	37.2	10.50	22.05	31192.0	96,915.51
1994	88.5	1772.9	30.4	11.28	21.89	40444.0	105,575.49
1995	83.7	1810.1	29.3	11.10	21.89	22695.0	141,920.24
1996	85.1	1854.2	32.5	11.34	21.89	49751.0	204,047.61
1997	85.0	1839.8	30.4	11.27	21.89	42861.5	242,899.79
1998	81.7	1724.9	32.4	10.54	21.89	52993.8	242,256.26
1999	84.5	1859.8	34.6	10.68	92.69	193412.9	231,661.69
2000	84.8	1738.3	36.1	10.89	102.11	285294.4	331,056.73
2001	84.5	1689.9	42.7	12.38	111.94	192731.8	372,135.65
2002	89.8	2237.3	54.9	12.38	120.97	435601.0	499,681.53
2003	90.3	6180.0	56.5	15.92	129.36	434299.0	865,876.46
2004	89.4	2763.6	55.7	16.47	133.50	677957.4	863,072.62
2005	89.4	2779.3	54.8	18.25	132.15	701667.3	804,400.82
2006	88.1	3907.6	53.3	19.44	128.65	177744.8	1,546,525.65
2007	89.0	3150.2	54.6	20.34	125.83	244153.6	1,936,610.77
2008	88.8	3279.0	54.2	21.30	118.57	374521.9	2,052,423.57
2009	88.6	3445.6	54.0	22.04	148.88	265473.4	3,049,790.98
2010	88.8	3291.6	54.3	22.68	150.30	294716.3	4,009,728.83
2011	88.8	3338.8	54.2	23.35	153.86	311570.5	3,037,314.46
2012	88.7	3358.7	54.2	24.02	157.50	290586.8	3,365,611.42
2013	88.8	3329.7	54.2	24.78	157.31	298957.9	3,470,884.90
2014	88.7	3342.4	54.2	25.58	158.55	300371.7	3,291,270.26
2015	88.7	3343.6	54.2	-	158.55	296638.8	3,375,922.20
***2016**	88.7	3343	54.2	12.79	158.55	298505.3	3,333,596.23

Sources: *CBN Statistical Bulletin, CBN Annual Abstract, NBS (2016), Nigerian Electricity Regulatory Commission (NERC), Federal Ministry of Power*

Key:

Ld_1LENES	=	*Log of Energy supply*
Ld_2LCAPU	=	*Log of Capacity Utilization*
Ld_3LTECH	=	*Log of Technology*
Ld_4LINVT	=	*Log of Investment*
Ld_5LEXCHR	=	*Log of Exchange Rate*
Ld_6FAST	=	*Log of fixed Asset*
Ld_7MANU	=	*Log of Manufacturing*

4.2 Presentation of Results

This section covers the presentation of and analysis of Results of Regression in relation to the objectives. The Regression was done using the Ordinary Least (OLS) Square method to obtain results.

Table 4.2.1 shows the regression result of the extent to which energy supply affect manufacturing sub-sector of South Eastern Zone. Hence, the empirical data associated with the regression results are as under-matrixed:

Table 4.2.1: Regression Result: Energy Supply and Manufacturing Sub-sector

Method of Estimation = Ordinary Least Squares

Dependent Variable:		ENE			
Current Sample:		1990 – 2016			
Number of Observations:		27			
Mean of dep. Var.	=	15.0886	*LM het. Test*	=	.779561 [.377]
Std. dev. of dep. Var.	=	.1.95346	*Durbin – Watson*	=	1.45978 [.006, .227]
Sum of squared residuals	=	2.60797	*Jarque – Bera test*	=	.503095 [1778]
Variance of residuals	=	.096588	*Ramsey's RESET2*	=	.199374 [.659]
Std. error of regression	=	.310786	*F (zero slopes)*	=	299.437 [.000]
R – Squared:	=	78485	*Schwarz B.I.C*	=	13.9551
Adjusted R –squared	=	.885728	*Log likelihood*	=	-5.29079

Variable	Estimated Coefficient	Standard Error	t-statistic	p-value
ΔC	14.1654	.571100	4.5506	[000]
$\Delta LMANU$	.755756	.061733	-2.52305	[0.18]
$\Delta LINDP$	.782174	.23864	2.2142	[.000]
$\Delta LCAPU$	.530516	.048762	3.77817	[.000]
$\Delta LTECH$	.812749	.050016	.254903	[.901]
$\Delta LGDP$	.642831	0.32262	-2.4181	[.700]
$\Delta LLAB$	.88755	.26715	-1.9972	[.184]

Source: *Gret-L Package (2017)*

Table 4.2.2: shows regression result of the influence energy generation relative to installed capacity on Business Growth of South Eastern Zone.

Table 4.2.2: Regression Result: Energy Generation and Business Growth

Method of Estimation = Ordinary Least Squares

Dependent variable:		GDP			
Current Sample:		1990 – 2016			
Number of Observations:		27			
Mean of dep. Var	=	13.7242	*LM het. Test*	=	.188187 [.170]
Std. dev. of dep. Var.	=	2.28953	*Durbin-Watson*	=	2.13692 [.243,.935]
Sum of squared residuals	=	48.4249	*Jarque-Bera test*	=	229.878 [000]
Variance of residuals	=	1.86250	*Ramsey's RESET2*	=	.852349 [.365]
Std. error o regression	=	1.36473	*F (Zero slopes)*	=	12.2497 [.000]
R-square:	=	905060	*Schwarz B.I.C*	=	62.4317
Adjusted R-squared	=	.811783	*Log likelihood*	=	-52.0345

Variable	Estimated coefficient	Standard Error	t-statistic	p-value
ΔC	24.0821	5.71094	4.21683	[000]
ΔLENE	.64435	.258218	-.171697	[.865]
ΔLMANU	.628694	.363010	1.71697	[.865]
ΔLINDP	.639169	.302385	2.129534	[.898]
ΔLIMP	.419814	.235599	-.508551	[.615]
ΔLEXP	-5.57325	1.27755	-2.01420	[.054]
ΔLCAPU	.546684	1.441361	2.34548	[0.411]
ΔLEXCHR	.681459	.384020	2.00831	[0.521]
ΔLBOP	.52448	.200121	1.98991	[0.015

Source: *Gret – L Package (2017)*

Table 4.2.3 shows Regression result of the influence of gas supply on industrial production of south eastern zone.

Table 4.2.3: Regression Result: Gas Supply and Industrial Production

Method of Estimation = Ordinary Least Squares

Dependent Variable: INDP

Current Sample: 1990 – 2016

Number of Observations: 27

Mean of dep. Var.	=	9, 555138	*LM het. Test*	=	3.11649 [.078]
Std. dev. of dep. Var.	=	1.64374	*Durbin – Watson*	=	1.09514 [.000, .045]
Sum of squared residuals	=	13.3457	*Jarque – Bera test*	=	2.60401 [.272]
Variance of residuals	=	.513296	*Ramsey's RESET2*	=	8.02300 [.009]
Std. error o regression	=	.716447	*F (zero slopes)*	=	27.4355 [.000]
R-squared:	=	905060	*Schwarz B.I.C*	=	41.8106
Adjusted R-squared	=	.810023	*log likelihood*	=	-31.4134

Variable	Estimated Coefficient	Standard Error	t-statistics	P-value
ΔC	14.5633	3.338629	4.30066	[000]
ΔLENE	-582913	.283081	-2.05918	[.050]
ΔLCAPU	.645296	.048714	1.929842	[.361]
ΔLTECH	.83083E-02	.424216R-02	-2617434	[.542]
ΔLINVT	4.336741	.124438	-2.52025	[.141]
ΔLEXCHR	.861513	.184599	4.66695	[.000]
ΔLMANU	-641324	.241782	1.998562	[0.006]

Source: *Gret – L Package (2017)*

Table 4.2.4: Sample Size Allocation Schedule

Serial (a)	Business Sector of S.E. (b)	Sample size (c)
1	Manufacturing	84
2	Mining & Quarrying	35
3	Accommodation & Food Service	34
4	Agriculture	28
5	Construction	24
6	Transport & Storage	34
7	Information & Communication	19
8	Education	16
9	Administrative & Support Services	12
10	Art. Entertainment & Recreation	10
11	Water Supply, Sewage, Waste Management & Remediation	8
12	Other Services	26
Total		**330**

Source: *Fieldwork Survey Report, (2017)*

Table 4.2.4 is table which shows the allocation questionnaire where manufacturing was allocated 84, mining & quarrying 35, accommodation & food services 34, agriculture 28, construction 24, transportation & storage 34, information & communication 19, education 16, administrative & support services 12, art, entertainment & recreation 10, water supply, sewage, waste management 8 and other services 26 making a total number of 330 questionnaires allocated.

Table 4.2.5: Obsolete Electricity Generation Equipment and Business Development

Serial (a)	Business Sector of S. E (b)	SA (c)	A (d)	D (e)	SD (f)	NI (g)	Total
1	Manufacturing	53	37	6	3	1	100
2	Mining & Quarrying	25	19	37	14	5	100
3	Accommodation & Food Service	47	32	11	7	3	100
4	Agriculture	18	12	37	21	12	100
5	Construction	30	21	27	19	3	100
6	Transport & Storage	28	26	30	15	1	100
7	Information & Communication	51	34	7	6	2	100
8	Education	20	15	38	20	7	100
9	Administrative & Support Services	38	29	18	11	4	100
10	Art. Entertainment & Recreation	49	37	10	3	1	100
11	Water Supply, Sewage, Waste Management & Remediation	37	39	13	8	3	100
12	Other Services	41	26	19	8	6	100

Source: *Fieldwork Survey Report, (2017)*

Table 4.2.5 and figure 4.2 are the respondents' response to the questionnaires in respect of the business sectors like manufacturing, mining & quarrying, accommodation & food services among other services. Under manufacturing sector 53 per cent strongly agree, 37 per cent agree, 6 per cent disagree, 3 per cent strongly disagree, 1 per cent no idea. On the mining & quarrying 25 per cent strongly agree, 19 per cent agree, 37 per cent disagree, 14 per cent strongly disagree, 5 per cent no idea. Manufacturing has the highest number of respondents that strongly agree, followed by art, entertainment & recreation, accommodation & food services and other services. While management and remediation has the highest number of disagree, followed by manufacturing and art, entertainment & recreation; and agriculture recorded the least by having 12 per cent disagree. And it ran through strongly disagree, and no idea.

Figure 4.1: A bar chart showing distribution of respondents on obsolete electricity generation Equipment on Business Development of South Eastern Zone of Nigeria with particular reference to Small and Medium Enterprises (SMEs)

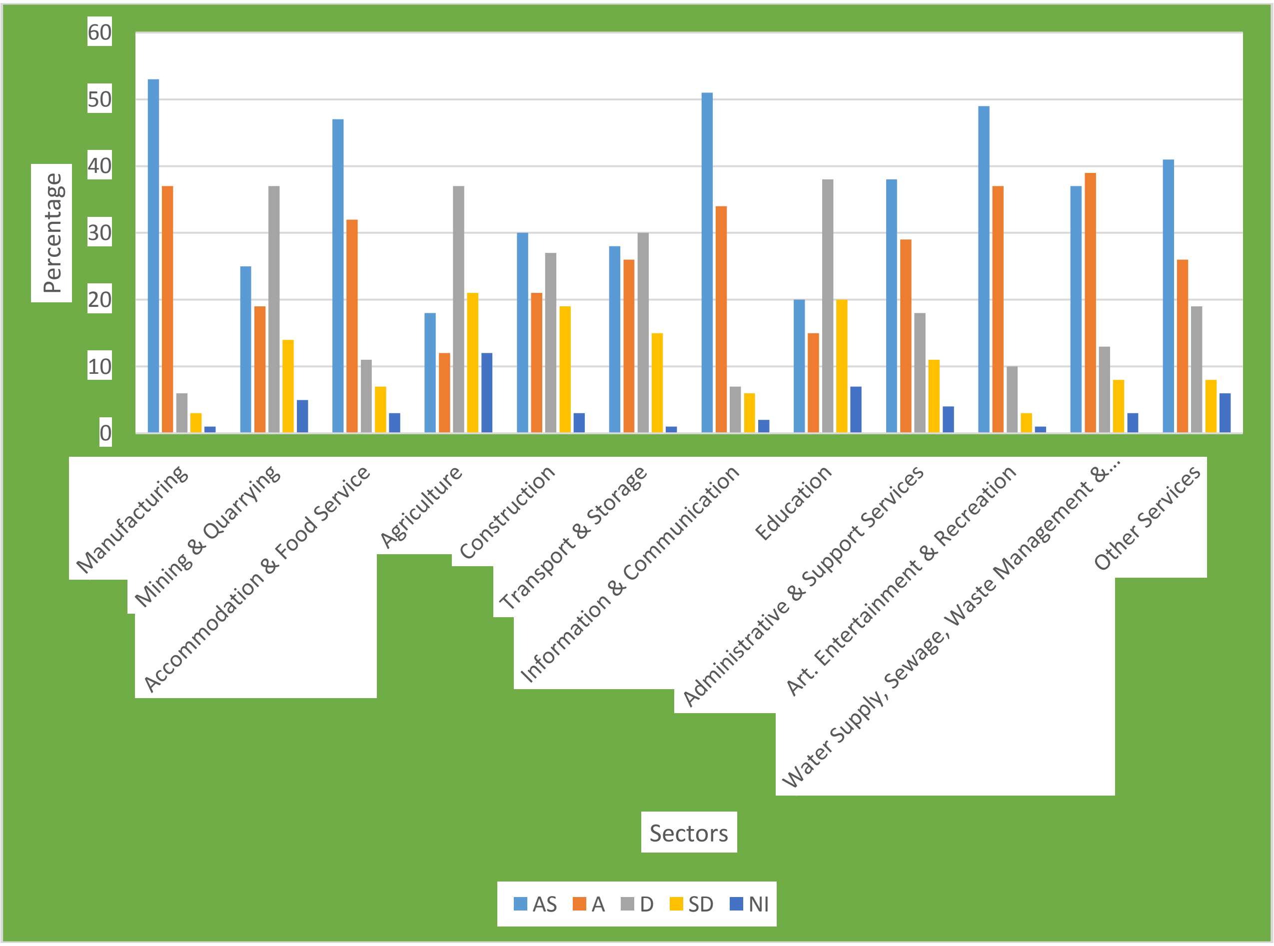


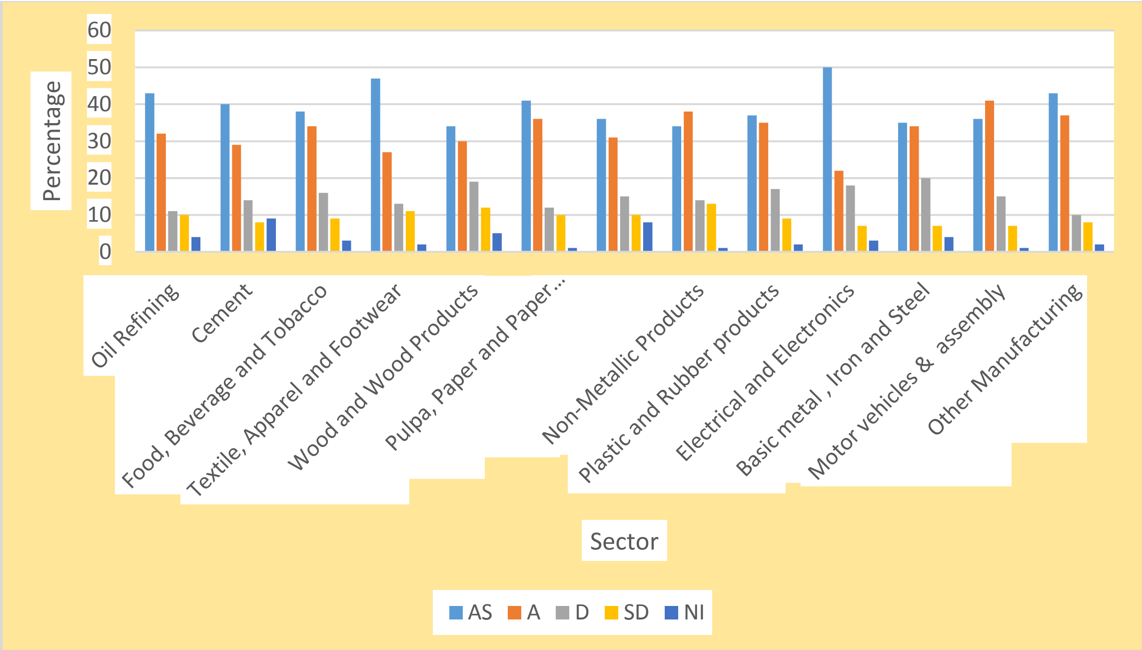
Table 4.2.6: Obsolete Electricity Generation Equipment and Business Development II

Serial (a)	Manufacturing sub-sector of South Eastern Zone of Nigeria (b)	SA (c)	A (d)	D (e)	SD (f)	NI (g)	Total
1	Oil Refining	43	32	11	10	4	100
2	Cement	40	29	14	8	9	100
3	Food, Beverage and Tobacco	38	34	16	9	3	100
4	Textile, Apparel and Footwear	47	27	13	11	2	100
5	Wood and Wood Products	34	30	19	12	5	100
6	Pulp, Paper and Paper Products	41	36	12	10	1	100
7	Chemical and Pharmaceutical Products	36	31	15	10	8	100
8	Non-Metallic Products	34	38	14	13	1	100
9	Plastic and Rubber products	37	35	17	9	2	100
10	Electrical and Electronics	50	22	18	7	3	100
11	Basic metal , Iron and Steel	35	34	20	7	4	100
12	Motor vehicles & assembly	36	41	15	7	1	100
13	Other Manufacturing	43	37	10	8	2	100

Source: *Fieldwork Survey Report, (2017)*

Table 4.2.6 and figure 4.2 are the respondents' response to the questionnaires in respect of the manufacturing sub - sector, oil refining, cement, food, beverage & tobacco, textile, apparel and footwear, wood and wood products, pulp, paper and paper products, chemical and pharmaceutical products, non-metallic products. Under oil refining 43 per cent strongly agree, 32 per cent agree, 11 per cent disagree, 10 per cent strongly disagree, 4 per cent no idea. Cement 40 per cent strongly agree, 29 per cent agree, 14 per cent disagree, 8 per cent strongly disagree, 9 per cent no idea. Textile, apparel and footwear 47 per cent strongly agree, 27 per cent agree, 13 per cent disagree, 11 strongly disagree, 2 per cent no idea. The figure 4.2 that electrical and electronics had the highest rectangular bar of 50 per cent of strongly agree, followed by 47 per cent apparel, wood and non-metallic had the least and others across the chart as indicated.

Figure 4.2: A bar chart showing distribution of respondents on obsolete electricity generation Equipment on Business Development of South Eastern Zone of Nigeria with particular reference to Small and Medium Enterprises (SMEs)



The above tables 4.2.4, 4.2.5 and 4.2.6 were considered as the result of the drawn reasonable number of SMEs in the figures of 1884 of the entire population sampling per sector of the small business operators in the aforementioned matrixed tables. While figures 4.1and 4.2, the bar-charts were further used to illustrate the outcome.

Nhj = *the Sample Size for each stratum and j ranges from 1, 2. ….n*

n = *total sample size*

^{n}hj = *the population sample size of each stratum*

N = *the total population*

Having determined the sample size and the proportion of each line of SMEs question that would help the research elicit the appropriate response to the question from the respondents. In addition to having adopted structured questionnaire with a total of 25 questions targeted at each indicator and suggested answers. The respondents were requested to tick (✓) in the column with appropriate answers, and total of 330 (three hundred and thirty copies) of questionnaire distributed as specified in 3.5 above.

The researcher applied statistical tool using Bowley's proportional allocation formulae (Kumar 1976:127) on each sub-sector and analysed them as follows:

(1) *Number of those in manufacturing sector;*

n	=	330
$Nhj1$	=	480
N	=	1884
$^{n}hj\ 1$	=	330*480/1884
	=	158400/1884
n	=	84

(2) *Number of those in mining & quarrying sector;*

n	=	330
$Nhj2$	=	200
N	=	1884
$^{n}hj\ 2$	=	330*200/1884
	=	65000/1884
n	=	35

(3) *Number of those in mining & Accommodation & Food Service;*

n	=	330
$Nhj3$	=	200
N	=	1884
$^{n}hj\ 3$	=	330*195/1884
	=	64350/1884
n	=	34

(4) *Number of those in Agricultural sector;*

n	=	330
$Nhj4$	=	160
N	=	1884
$^{n}hj\ 4$	=	330*160/1884
	=	62800/1884
n	=	28

(5) *Number of those in Construction sector;*

n	=	330
$Nhj5$	=	139
N	=	1884
$^{n}hj\ 5$	=	330*139/1884
	=	45870/1884
n	=	24

(6) *Number of those in Transport & Storage sector;*

n	=	330
$Nhj6$	=	195
N	=	1884
$^{n}hj\ 6$	=	330*195/1884
	=	64350/1884
n	=	34

(7) *Number of those in Information & Communication sector;*

n	=	330
$Nhj7$	=	110
N	=	1884
$^{n}hj\ j7$	=	330*110/1884
	=	36300/1884
n	=	19

(8) *Number of those in Education sector;*

n	=	330
$Nhj8$	=	93
N	=	1884
$^{n}hj\ j8$	=	330*93/1884
	=	30690/1884
n	=	16

(9) *Number of those in Administrative & Support Services sector;*

$$\mathbf{n} = 330$$

$$\mathbf{Nhj9} = 67$$

$$\mathbf{N} = 1884$$

$$\mathbf{{}^{n}hj\ 9} = 330*67/1884$$

$$= 22110/1884$$

$$\mathbf{n} = 12$$

(10) *Number of those in Art. Entertainment & Recreation sector;*

$$\mathbf{n} = 330$$

$$\mathbf{Nhj10} = 55$$

$$\mathbf{N} = 1884$$

$$\mathbf{{}^{n}hj\ 10} = 330*67/1884$$

$$= 18150/1884$$

$$\mathbf{n} = 10$$

(11) *Number of those in Water Supply, Sewage, Waste Management & Remediation sector;*

$$\mathbf{n} = 330$$

$$\mathbf{Nhj11} = 48$$

$$\mathbf{N} = 1884$$

$$\mathbf{{}^{n}hj\ 11} = 330*48/1884$$

$$= 15840/1884$$

$$\mathbf{n} = 8$$

(12) *Number of those in Other Services sector;*

$$\mathbf{n} = 330$$

$$\mathbf{Nhj12} = 150$$

$$\mathbf{N} = 1884$$

$$\mathbf{{}^{n}hj\ 12} = 330*150/1884$$

$$= 49500/1884$$

$$\mathbf{n} = 26$$

For a check of accuracy, we have

$$\mathbf{{}^{n}hj = {}^{n}hj1+{}^{n}hj2+{}^{n}hj3+{}^{n}hj4+{}^{n}hj5+{}^{n}hj6+{}^{n}hj7+{}^{n}hj8+{}^{n}hj9+{}^{n}hj10+{}^{n}hj11+{}^{n}hj12}$$

$$\mathbf{n} = 84+35+34+28+24+34+19+26+12+10+8+26$$

$$\mathbf{n} = 330$$

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Effect of Energy Supply on Manufacturing sub-sector of south eastern zone of Nigeria

A close look at regression result in respect to objective 1 of the study, that is, effect of Energy supply on Manufacturing sub-sector reveals that the coefficient of estimated constant term in table 4.2.1 is 14.1654 and its statistically significant and better at 0.1 per cent which shows a functional relationship between the energy supply and manufacturing sub-sector of south eastern zone.

The coefficient of MANU when regressed with energy is positively signed and statistically significant at 0.02 per cent. This indicates that improvement in the energy sub-sector, subsequently leads to an improved and sustained business development. Similarly, when Energy sub-sector is regressed with Industrial Production, the estimate coefficient is positively signed and is statistically significant at 0.1 per cent. This implies also that there exist a relationship between energy and industrial production.

In the same vein, the coefficient of Capacity Utilisation (CAPU) carries a positive sign and also statistically significant and better at 0.1 per cent. This indicates that supply enhances Capacity Utilisation as well as Industrial Utilisation. The coefficient of Technology and Business Growth is positively signed and both are statistically significant, implying that increase in energy supply facilitates technology and business growth, thereby fostering business development.

The coefficient of Labour force is positively signed and fairly significant at 0.2 per cent. Durbin –Watson of 1.45978 is greater than Adjusted R-squared (R^2) .88755. This indicates that there is no spurious auto-correlation in the model and it goes to explain the explanatory part of the model; thereby confirming that the energy sub-sector contributes meaningfully to the business development.

5.1.1 Test of Hypotheses 1

The hypotheses presented in chapter one of the study which is to determine the extent to which energy supply affects the manufacturing sub-sector of south eastern zone Nigeria is tested using t-statistic. From the regression analysis table 4.2.1 at 5 per cent level of significant confirmed that energy supply is statistically insignificant at t-calculated value of -2.52305 and is less than the tabulated value of 1.7207. In view of this, the null hypotheses is rejected while the alternate is accepted which implies that there is significant effect of energy supply on manufacturing sub-sector. This is line with Moyo (2012) and Akuru etal (2011) in their result of the study on the impact of power disruptions on firm productivity in the manufacturing sector of Nigeria. Faridula (2011 and Magazzion (2011) in Malaysia revealed also that energy insufficiency and disruptions have significant effect in manufacturing and all productive sectors of the economy.

5.2 Influence of Energy generation relative to Installed Capacity on Business Growth

Examining the regression result in respect of the influence of energy generation relative to installed capacity on business growth reveals an interesting picture, in that the coefficient of the constant term 24.0821 and it is statistically significant and better at 0.01 per cent, this shows that energy generation is relative to installed capacity on business growth meaningfully.

When energy generation is regressed in Gross Domestic Product (GDP), the coefficient estimate carries a positive sign and it’s statistically not significant. This is indeed at variance with apriori expectation. The coefficient of MANU is positively signed and it’s fairly significant, implying that the increase in energy generation and supply contributes to increase in business growth. The coefficient of the Industrial Production also carries a positive sign and statistically significant, which implies that Industrial Production facilitated by energy generation relative to installed capacity lead to improvement on business growth.

The coefficients to Import and Export in relation to business development of south eastern zone of Nigeria are statistically significant, except Import which is against *apriori* expectation; this implies that business development, facilitated by satisfactory energy supply encourages Export of goods and services which subsequently result in better business growth.

Similarly, the coefficient of Capacity Utilisation (CAPU) and real Exchange Rate are positively signed, and both are statistically significant at 0.4 per cent and 0.5 per cent respectively. This demonstrates the implications of energy sub-sector to business development.

When Gross Domestic Product (GDP) is regressed with Balance Of Payment (BOP), the coefficient of the constant term is positive and statistically significant at 0.02 per cent, implying that the energy sub-sector facilitates business development which in turn results in improved business growth. The Durbin-Watson equation is 2.13692 and it's greater than the Adjusted R-square (R^2) of 0.811783 signifying that there is no case for auto-correlation in the model. These further explain that the equation is a good fit. Implying that energy sub-sector is a boaster to business development resulting to business growth.

5.2.1 Test of Hypotheses 2

The regression analysis of the influence of energy generation relative to installed capacity on business Growth (GDP) is tested using t-statistic. From the regression analysis table 4.2.2 at 5 per cent level of significant confirmed that business growth (GDP) is statistically insignificant at t-calculated value of –0.171697 is less than the tabulated value of 3.00. In view of this the null hypotheses is accepted while the alternate is rejected which implies that the Business Growth (Proceed GDP) has not been optimized/pronounced due to energy supply inadequacies. This is in line with Fisher, Gutierrez and Serra (2003) study of the effect of the energy sector reform of the economy of Chile on the efficiency of businesses. Kaseke and Hosking (2013) also undertook a study on the relationship between energy consumption and Gross Domestic Product in South Africa.

5.3 Influence of gas Supply on Industrial Production

A close Look at the regression result of the objective 3, that is, influence of gas Supply on Industrial Production reveals that the coefficient of estimated constant term in table 4.2.3 is 14.5633 and its statistically significant or better than at 0.1 per cent which implies a functional relationship between the gas supply and industrial production.

The coefficient of ENE when regressed with Industrial Production is positively signed and statistically significant. The regression of coefficient of generated energy has a negative sign (-582913) and the p-value (.050) is fairly significant at 0.1 per cent. This suggests that the management (apriori) expectation was not met and that the energy supply has a direct relationship to Industrial Production. Similarly, the estimated coefficient term of the Capacity Utilisation (CAPU) carries a positive sign and also statistically significant and better at 0.4 per cent. This indicates that CAPU has a strong influence to the industrial production.

The estimated coefficient of Technology and Industrial Production is positively signed and also statistically significant, showing strong indication that increase in energy supply facilitates technology and enhances industrial production, thereby fostering business development. The coefficient of Investment is positively signed and fairly significant at 0.1 per cent. The value of Durbin Watson is 1.09514, greater than Adjusted R-squared 0.810023. This confirms that the energy supply has meaningful relationship to the business development of South Eastern zone of Nigeria.

The Exchange Rate has estimated coefficient of .861513 indicating strong influence of the variable, with p-value of 0.1 per cent. With the Adjusted R-square (R^2) of 0.810023 is a good fit for the model. The relationship indicates strong effect of the variables on the industrial production.

The estimated coefficient of MANU is -641324, and positively signed with p-value 0.01 per cent. However, manufacturing is insignificant; implying that energy supply is not adequate and this had lead to low performance and adversely affect the development of businesses. The Durbin Watson equation is 1.09514 and is greater than the R-square (R^2) .644693 which is an indication of good fit for the model.

5.3.3 Test of Hypotheses 3

The regression analysis of the influence of the gas supply on industrial production from table 4.2.3; show that industrial production is statistically insignificant at t-calculated value of -2.05918 and is less than the tabulated value of 2.92. In view of this the null hypotheses is accepted while the alternate is rejected which implies that the industrial production impact has not been felt due to energy supply inadequacies and insufficiency. This is in line with the Mallick (2007) study on the reforms on the natural gas and coal consumption on the industrial sub-sector of the economy of India. Ukpong (2009) study using simple regression analysis stated that there is a positive relation between consumption and industrialization.

5.4 Extent to which the use of obsolete Electricity generation Equipment affect the Business Development of South Eastern Zone of Nigeria with Particular Reference to Small and Medium Enterprises (SMEs)

Examining the objective 4, Table 4.2.4 and figure 3 above under Manufacturing; Out of 330 (Three hundred and thirty) were the questionnaire signed. A total of 53 per cent strongly agreed which indicated that obsolete electricity generation equipment affects the performances of SMEs, 37 per cent respondents agreed, 6 per cent disagreed, 3 per cent strongly disagreed and 1per cent respondent had no idea. This, therefore, implies that the concern authorities need to act urgently to address the trend in order to enhance the growth of SMEs which would serve as a catalyst for business development in South Eastern Zone.

Mining and quarrying – 25 per cent strongly agreed, 19 per cent agreed, 37 per cent disagreed, 14 per cent strongly disagreed and 5 per cent had no idea. This indicated that mining and quarrying does not need energy generation to operate considering the number of respondents who disagreed to the assertion. Accommodation and Food Service has 47 per cent strongly agreed, 32 per cent agreed, 11per cent disagreed, 7 per cent strongly disagreed, 3 per cent has no idea. It implies that majority of the respondents affirms that obsolete electricity generation equipment (technology) affects them and there is need to address their concerns. Agriculture recorded 18 per cent strongly agreed, 12 per cent agreed, 37 per cent disagreed, 21 per cent strongly disagreed, and 12 per cent no idea. This indicated that agriculture as in Mining do not require as much electricity generation as required in some other sectors. Construction showed 30 per cent strongly agreed, 21per cent agreed, 27 per cent disagreed, 19 per cent strongly disagreed, and 3 per cent indicated no idea. This implies old electricity generation equipment has adverse effect on the construction. Under Transportation and Storage 28 per cent strongly agreed, 26 per cent agreed, 30 per cent disagreed, 15 per cent strongly disagreed and 1per cent responded no idea. This is a reverse of what is obtainable in the manu and an indication that the energy generation is not required as much as in aforesaid sub-sectors. Information and Technology has 51 per cent strongly agreed, 34 per cent agreed, 7 per cent disagreed, 6 per cent strongly disagreed, and 2 per cent no idea. This implies that the sub-sector serves as a catalyst for information and technology and it is in line with apriopri expectation. Education recorded 20 per cent strongly agreed, 15 per cent agreed, 38 per cent disagreed, 20 per cent strongly disagreed and 7 per cent no idea. Administrative and Support Services, has 38 per cent strongly agreed, 29 per cent agreed, 18 per cent disagreed, 11 per cent strongly disagreed, and 4 per cent no idea.

Similarly, Art, Entertainment and Recreation, has 49 per cent strongly agreed, 37 per cent agreed, 10 per cent disagreed, 3 per cent strongly disagreed, and 1 per cent no idea. This has shown that they have strong effect electricity generation. Therefore there is need for authorities concern to act as appropriate by adopting policies that would address the issue of obsolete electricity generation equipment. Water supply, sewage, waste management and remediation also has 37 per cent strongly agreed, 39 per cent agreed, 13 per cent disagreed, 8 per cent strongly disagreed, 3 per cent and no idea. Under other services, a total of 41 per cent respondents strongly agreed, 21 per cent agreed, 19 per cent disagreed, 8 per cent strongly disagreed, and 6 per cent no idea.

5.4.1 Extent to which the use of obsolete Electricity generation Equipment affects energy generation on the manufacturing sub-sector of South Eastern Zone of Nigeria with Particular Reference to Small and Medium Enterprises (SMEs)

The researcher examined the objective 4, in order to analyse the submissions of the respondents as indicated above on table 4.2.5; under the manufacturing sub-sector of the South Eastern Zone. Oil refining has a total of 43 per cent strongly agreed, 32 per cent agreed, 11 per cent disagreed, 10 per cent strongly disagreed, and 4 per cent no idea. This signifies that the sub-sector need energy generation to operate. Cement has 43 per cent strongly agreed, 29 per cent agreed, 14 per cent disagreed, 8 per cent strongly disagreed, 9 per cent no idea. This indicates strong assertion that electricity generation is required in the sub-sector with modern technology. Food, Beverage and Tobacco has 38 per cent strongly agreed, 34 per cent agreed, 16 per cent disagreed, 9 per cent strongly disagreed, 3 per cent no idea. Textile, Apparel and Footwear has 47 per cent strongly agreed, 27 per cent agreed, 13 per cent disagreed, 11 per cent strongly disagreed, 2 per cent no idea. Wood and Wood Products has 34 per cent strongly agreed, 30 per cent agreed, 19 per cent disagreed, 12 per cent strongly disagreed, 5 per cent no idea. Pulp, Paper and Paper Products has 41 per cent strongly agreed, 36 per cent agreed, 12 per cent disagreed, 10 per cent strongly disagreed, and 1 per cent no idea. Chemical and Pharmaceutical Products has 36 per cent strongly agreed, 31 per cent agreed, 15 per cent disagreed, 10 per cent strongly disagreed, 8 per cent no idea. Non-metallic Products has 34 per cent strongly agreed, 38 per cent agreed, 14 per cent disagreed, 13 percent strongly disagreed, and 1 per cent no idea. Plastic and Rubber Products recorded 37 per cent strongly agreed, 35 per cent agreed, 17 per cent disagreed, 9 per cent strongly disagreed, and 2 per cent no idea. Under the Electrical and Electronics has 50 per cent respondents strongly in agreement, 22 per cent agreed, 18 per cent disagreed, 7 per cent strongly disagreed, and 3 per cent indicated no idea. This sector shows that majority of the respondents affirm that the obsolete electricity generation equipment has strong effect on the energy generation and hinders immensely the performance of businesses in the South Eastern Zone. Basic metal, Iron and Steel has 35 per cent strongly agreed, 34 per cent agreed, 20 per cent disagreed, 7 per cent strongly disagreed, and 4 per cent no idea. Motor vehicles and assembly has 36 per cent strongly agreed, 41 per cent agreed, 15 per cent disagreed, 7 per cent strongly disagreed, and 1 per cent no idea. Under manufacturing (oil refining) has 43 per cent strongly agreed, 37 per cent agreed, 10 per cent disagreed, 8 per cent strongly disagreed, 2 per cent no idea.

This means that majority of the respondents indicated that obsolete electricity generation has direct relationship on the performances of the sub-sector of the economy of the South Eastern Zone as indicated above, and it is in line with apriopri expectation.

In the same vein, looking at figure3, of the bar chart showing the distribution of the effect of the obsolete electricity equipment in energy generation with particular reference to SMEs; it is very clear that the manufacturing, information & communication, Art. Entertainment & Recreation recorded 50 per cent strongly agreed, followed by accommodation and food services, administrative & support services 39 per cent to 40 per cent respectively. On the figure 4, bar chart showing distribution of the effect on electricity equipment in energy generation on business development of south eastern zone of Nigeria with particular reference to SMEs. The Textile, Apparel and Footwear, Electricals and Electronics, recorded highest percentage of close to 50 per cent affirmation, that is, strongly agreed which goes to support the assertion that obsolete electricity equipment in energy generation has adverse effects in the afore-stated sub-sectors of the South Eastern zone, followed by oil refining, motor vehicles & assembly, and the non-metallic products which has one of the highest strongly disagreed while the numbers of the strongly agreed and agreed are almost at par among others.

5.4.4 Test of Hypotheses 4

Test Statistics: X^2

Test Statistics	
Would an efficient Electricity Generation Equipment enhance Business Development	
Chi-Square	73.200a
df	11
Asymp. Sig.	.000

Source: Author's computation, using SPSS version 19.0

1. This is tested from responses from table above using the model below:
2. $X^2 = \sum ((Oi - Ei))/Ei$
3. Row Total/Column Total*Grand Total
4. Therefore,

$$X^2 = 73.20$$

Test Statistics: $X^2{}_c$ = 73.20, df=11; df=Degree of freedom, $X^2{}_t$ = 4.58

Where:

$X^2{}_c$ = Chi-square calculated

$X^2{}_t$ = Chi-square tabulated at 95 percent significant level

Decision Rule:

Reject H_0 if and only if t-calculated is greater than t-table. If t-table value is greater than t-calculated value then accept H_0 and reject H_1 otherwise if t-table value less than t-calculated value, reject H_0 and accept H_1

Decision:

A. X^2-test

Table value = 4.58; calculated value = 73.23since 4.58 is not greater than 73.23. Therefore, H_0 is rejected. This means that there is significant relationship between obsolete electricity generation equipment and enhance business development by extension the growth of the Nigerian economy.

From the above tables 4.2.4 & 4.2.5 and figures 3 & 4; going by the analysis of the administered questionnaire showed that obsolete electricity generation equipment in energy generation has relationship between SMEs and the services they deliver to the South Eastern Zone. These also go to show that increase in the electricity generation by improving on the technology innovation would also be an increase in the service delivery capabilities and output of the various SMEs in the South Eastern Zone. The findings is line with that of Berisha-Namani(2009), who studied the impact of technology on the operations of the Small and Medium sized Enterprises and concluded that its impact is indispensible for quick business growth and development. Peters et al (2011) studied performance of micro manufacturing firms in Benin which also said that supply and consumption is affected by costs of old technology.

CHAPTER SIX
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Summary of Findings

Energy supply in every aspect of the Nation's socio-economic life provides platform for business development. In the same vein, inadequate supply of energy restricts socio economic development, limits business activities and adversely affects the quality of life of citizens. Availability of energy supply increase industrial production/output thereby leading to optimal performance of the manufacturing sub-sector of the economy. The following findings were made:

i. The **first** objective was regressed Energy supply to Manufacturing, Industrial Production, Technology, Labour productivity and other business indicators as expressed on table 4.2.1 of the model. The regression shows a functional relationship between the energy supply and manufacturing sub-sector. This result agrees with the Parsons, (1979) social system theory of management and structural functionalism, which is related to Ansoff, (1965) theory that was centred on synergy that underscores the need for the whole system to interact and operate together for greater efficiency.

ii. That sustainable energy supply would help to increase capacity utilization as well as reducing exchange rate which ultimately influences the business growth and activities substantially. The findings of Jamash, (2004), Barros (2004 and Penrose, (1993) were all in agreement with the results that found energy supply positive to the business development.

iii. That there is a clear indication that Industrial Production, Exchange Rate, and Technology have immense relationship to business development.

iv. That Import and Export are significant to business growth, implying that business growth would be facilitated by satisfactory energy supply, which would also encourage export of goods and services.

v. The **second** objective reveals that energy supply has influences on business growth meaningfully when regressed in Gross Domestic Product (GDP); it also implies that increase in business development in relation to energy generation/supply contributes to enhanced business growth.

vi. That Industrial Production facilitated by energy supply lead to improvement to business growth. It is in agreement with Kaseke et al (2013), assertion.

vii. That satisfactory energy supply encourages Export of goods and services which subsequently result in better business growth situation which suggest that efforts should be made to improve the nation's export.

viii. That when Gross Domestic Product (GDP) is regressed with Balance Of Payment (BOP), the coefficient of the constant term is positive and statistically significant at 0.02 per cent, implying that the energy sub-sector facilitates business development and the argument becomes that if export is encouraged it enhances the positive BOP. It also relate to some of the Authors assertion like Akinola, (2008), Watts, (2001) and Sarbeshi, (2008).

ix. The **third** objective regressed energy supply to Industrial Production, the result reveals that the coefficient of estimated constant term is statistically significant and better at 0.1 per cent which implies a functional relationship between the energy supply and industrial production.

x. Similarly, the findings indicate that technology, Exchange Rate, and capacity utilization would foster business development in its aggregate because of their high level of significance in industrial production.

xi. The **fourth** objective, examining the extent to which the use of obsolete Electricity generation Equipment affects business development of South Eastern Zone with Particular Reference to Small and Medium Enterprises (SMEs). The results of the analysis reveal that inability to access energy supply constitutes impediments to the business growth, expansion and performances of SMEs in the Zone. The findings are line with that of Berisha-Namani (2009).

xii. That there are relationship between obsolete electricity generation equipment and the performances of SMEs' various sub-sectors (manufacturing, information & communication, Art, Entertainment & Recreation, etc).

xiii. That obsolete electricity generation equipment adversely affects the successful operations of SMEs and business development of the south eastern zone.

6.2 Conclusion

The study ascertained the effect of energy sector on the business development of South Eastern Zone of Nigeria from 1990 - 2016. Based on the findings of this research, there are many more variables that have significant effect in the determination of business development in the South Eastern Zone of Nigeria. However, the findings disclosed that non performance of Energy Sector has significant and negative effect on business development in the South Eastern Zone of Nigeria.

6.3 Recommendations

Going through the study on energy sub-sector and business development, the following recommendations became necessary and expedient:

i. That Federal Government should provide two or more functional power stations in the South Eastern zone, and alternative sources of adequate energy infrastructure, liberalize them for more reliable and efficient energy supply that would continuously support the manufacturing, industrial productions/outputs of the South Eastern zone.

ii. There should be energy efficiency policies in the area of power generation, and provision of electricity in all critical sectors of the economy that would ensure

Business Growth, that would promote export of goods and services. In addition to putting in place strict regulation on importation of foreign goods so that local businesses will thrive.

iii. There is need to ensure adequate supply of 'gas to power' supply of energy demand to the industrial production sub-sector of the economy in order to enhance their maximum output, which ultimately would encourage Foreign Direct Investment (FDI) into the Country.

iv. There is need for government to open up other frontiers of ensuring that electricity generation in the SMEs in the South Eastern Zone are sustained in order to open up other externalities as it is the fulcrum of industrialization. In addition to ensuring that technology innovation in energy infrastructure that ensure steady and stable electricity supply in SMEs are encouraged, because it is critical in creating employment, increase competitiveness through the application of e-business, e-commerce through internet usage, among others.

6.4 Suggestion for further Studies

This research centred on Energy Supply and Business Development of South Eastern Zone of Nigeria for the period 1990 to 2016. Further researches could focus on application of other tools which may provide different Results from ours on Energy Sub-Sector and Business Development of South Eastern Zone of Nigeria. Develop other specific areas of Energy Sub-Sector and Business Development which this study suggest should form the basis for further investigation and based on other theoretical framework.

6.5 Contribution to Knowledge

This study focused on Energy sector and Business Development of South Eastern Zone of Nigeria. By the application of Econometric tools and related statistics, the study has established the contribution of Energy Sub-Sector to Business Development. Similarly the study contribute to learning in the sense that the extent to which energy supply affects manufacturing sub-sector, the influence of energy generation relative to installed capacity on business growth, the influence of gas supply on industrial production as well as the extent to which the obsolete electricity generation equipment affects Business Development of South Eastern Zone of Nigeria have been established.

The result of the work has shown empirically that Public Utilities are built upon Natural Monopoly and the criticisms were valid, this is because wherever you have monopoly consumers are deprived, and exploited. The hallmark of every monopoly is inefficiency and most public utilities in Nigeria failed for instance, NEPA and other countries for lack of competition.

The result has also shown that the South Eastern zone’s electric supply need to be de-monopolized, for it has shown that there is a grand design to frustrate productive activities of the zone , considering the fact that all the power stations in the zone are borrowed, the industrial clusters of the zone notwithstanding.

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Questionnaire

Department of Business Administration
Faculty of Management Sciences
Nnamdi Azikiwe University
Awka

13th October, 2017.

Dear Respondents,

I am a Post graduate Student of Business Administration Department, Faculty of Management Sciences, Nnamdi Azikiwe University, Awka, Nigeria. I am currently conducting a research on Energy Sector and Business Development of South Eastern Zone of Nigeria.

I am, therefore, soliciting your Kind and honest answers to the questions.

I assure you that your responses will be used strictly for academic purposes.

Thank you for your kind co-operation.

Nwabisi, Paul Nnaemeka

Questionnaire

SECTION A

Do you agree that obsolete electricity generation Equipment affects Business Development of South Eastern Zone of Nigeria with particular reference to Small and Medium Enterprises (SMEs) performance of the following listed sub-sectors of Manufacturing:

Please carefully tick (√) as appropriate

1. Do you agree that obsolete electricity generation Equipment affects the performance of the Oil Refining sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

2. Do you agree that obsolete electricity generation Equipment affects the performance of the Cement sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

3. Do you agree that Obsolete electricity generation Equipment affects the performance of the Food, Beverage and Tobacco sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

4. Do you agree that obsolete electricity generation Equipment affects the performance of the Textile, Apparel and Footwear sub-sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

5. Do you agree that obsolete electricity generation Equipment affects the performance of the Wood and Wood Products sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

6. Do you agree that obsolete electricity generation Equipment affects the performance of the Pulp, Paper and Paper Products sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

7. Do you agree that obsolete electricity generation Equipment affects the performance of the Chemical and Pharmaceutical Products sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

8. Do you agree that obsolete electricity generation Equipment affects the performance of the Non-Metallic Products sector of Nigerian economy?

(a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

9. Do you agree that obsolete electricity generation Equipment in Energy affects the performance of the Plastic and Rubber products sector of Nigerian economy? (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

10. Do you agree that obsolete electricity generation Equipment in Energy affects the performance of the Electrical and Electronics sector of Nigerian economy?
(a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

11. Do you agree that obsolete electricity generation Equipment in Energy affects the performance of the Basic metal, Iron and Steel sector of Nigerian economy? (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

12. Do you agree that obsolete electricity generation Equipment in Energy affects the performance of the Motor vehicles &assembly sector of Nigerian economy? (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

13. Do you agree that obsolete electricity generation Equipment in Energy affects the performance of the Other Manufacturing sector of Nigerian economy?
(a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

SECTION B

To what extent do you agree that obsolete Electricity Generation Equipment affects Business Development of South Eastern Zone of Nigeria with a particular reference to Small and Medium Enterprises (SMEs) performance of the following sectors:

Please carefully tick (√) as appropriate

1. Do you agree that obsolete electricity generation Equipment affects the performance of the Manufacturing sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

2. Do you agree that obsolete electricity generation Equipment affects the performance of the Mining & Quarrying sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

3. Do you agree that obsolete electricity generation Equipment affects the performance of the Accommodation & Food Services sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

4. Do you agree that obsolete electricity generation Equipment affects the performance of the Agricultural sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

5. Do you agree that obsolete electricity generation Equipment affects the performance of the Construction sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

6. Do you agree that obsolete electricity generation Equipment affects the performance of the Transportation & Storage sector of Nigerian economy? (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

7. Do you agree that obsolete electricity generation Equipment affects the performance of the Information & Communication sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

8. Do you agree that obsolete electricity generation Equipment affects the performance of the Education sector of Nigerian economy?
   (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

9. Do you agree that obsolete electricity generation Equipment in Energy affects the performance of the Administrative & Support Services sector of Nigerian economy?
(a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

10. Do you agree that obsolete electricity generation Equipment in Energy affects the performance of the Art. Entertainment & Recreation sector of Nigerian economy?
(a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

11. Do you agree that obsolete electricity generation Equipment affects the performance of the Water Supply, Sewage, Waste Management & Remediation sector of Nigerian economy?
(a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea

12. Do you agree that obsolete electricity generation Equipment in Energy affects the performance of the Other Services sector of Nigerian economy? (a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) No Idea